Appendix D
Biological Assessment
Travel Plan

File Code: 2670
Date: April 11, 2006

Mark Wilson
Field Supervisor
US Fish and Wildlife Service
585 Shepard Way
Helena, MT 59601

Dear Mark,

The Gallatin National Forest has completed a Biological Assessment (BA) on the effects of our Forest Travel Plan Alternative 7M on threatened and endangered species. The alternative consulted upon is Alternative 7M (7-Modified), which may not be the final preferred alternative in all cases. No alternative will be selected as the final preferred that has effects on threatened or endangered species that are greater than those of Alternative 7M.

There are no federally listed endangered species on the Forest. Species listed as threatened that occur on the Gallatin National Forest include the grizzly bear (*Ursus arctos horribilis*), bald eagle (*Haliaeetus leucocephalus*), and Canada lynx (*Lynx Canadensis*). The gray wolf (*Canis lupus*) in this area is part of a nonessential, experimental population under the Endangered Species Act (ESA). There is currently no critical habitat designated for any of these species. The Travel Plan will not jeopardize the continued existence of the gray wolf. This species is addressed in detail in the FEIS, but is not addressed in the attached BA. At this time, grizzly bears are not found on the Forest north of I-90, and the Forest does not consult on the effects of grizzly bears north of I-90, outside of the area where bears occur. The determination reached for grizzly bear and bald eagle was "may affect, likely to adversely affect." The determination made for Canada lynx was "may affect, not likely to adversely affect."

For the bald eagle, a determination of "may affect, likely to adversely affect" is made if the Greater Yellowstone Bald Eagle Management Plan (GYBEMP) guidance cannot be met in all cases. The GYBEMP guidelines recommending that minimal activity levels not be exceeded within Zone I would not be met for either the Ridge or Narrows nest territories under Alternative 7M. In the summer, disturbance levels from motorized vehicle use on the road near the Moonlight nest would exceed GYBEMP guidelines for Zones I and II. However, the road was constructed and had been used many years before the territory was established, and this pair has been among the most productive on Hebgen Lake. Also, GYBEMP guidelines for the Halford Camp nest would be met for Zone I, but exceeded for Zones II and III.

For the grizzly bear, a determination of "may affect, likely to adversely affect" was made. The issue of motorized access routes into grizzly bear habitat is very important. The Grizzly Bear Conservation Strategy (ICST 2003) was used as the means by which to assess the effects of the Travel Plan alternatives. Human access into grizzly bear habitat, no matter the means, can affect grizzly bears. The overall and long-term effects of implementation of a Travel Plan, and an Alternative such as 7M that increases secure habitat and decreases motorized routes from the present, has less of an impact on grizzly bears than the baseline situation, and is likely to benefit

bears in the long-term. Alternative 7M increases secure habitat percentages, reduces motorized access routes in many locations on the Forest, does not increase motorized access route densities in any bear subunit, and makes improvements in the three subunits on the Gallatin National Forest "in need of improvement" (Gallatin #3, Madison #2, and Henry's Lake #2) according to the Conservation Strategy (2003). Alternative 7M also reduces the amount of acreage open to snowmobiling, thus protecting more potential denning habitat for grizzly bears. Although this Travel Plan will be an improvement for grizzly bears over the baseline condition for motorized access on the Gallatin National Forest, and large completely non-motorized areas exist, there are also some areas of high motorized route density, thus the determination of effect of this Travel management Alternative on the grizzly bear is "may affect, likely to adversely affect."

The determination for the lynx is "may affect, not likely to adversely affect." This is because all Lynx Analysis Units have met the intent of the LCAS (Lynx Conservation Assessment and Strategy 2000) under Alternative 7M. The primary potential impact to lynx from travel management is from winter use and snow compaction. In all cases, new route, compacted by any means, have been balanced by increasing acres of snowmobile closures.

Because the BA found a 'may affect-likely to adversely affect,' for the bald eagle and grizzly bear, we are requesting formal consultation with your agency.

Please feel free to contact Marion Cherry, Gallatin Forest Biologist (406-587-6739 or mbcherry@fs.fed.us), who was the primary author of this document and its grizzly bear analysis, if you need further information during the consultation process. District Biologists Rachel Feigley and Andy Pils were responsible for the Canada lynx analysis the bald eagle analysis, respectively.

Sincerely,

/S/ REBECCA HEATH
REBECCA HEATH
Forest Supervisor

Biological Assessment
Travel Plan
Gallatin National Forest

April 2006

INTRODUCTION

Consultation pursuant to Section 7 of the Endangered Species Act (ESA) between the US Fish and Wildlife Service (USFWS) and another federal agency normally occurs when a federal action is proposed. The proposal's impacts to threatened and endangered species are analyzed in what is called a Biological Assessment. In some cases, consultation may be done on an existing activity in accordance with the regulations at 50 CFR s 402.16. The action agency makes determination of effect on individuals of the species. If the action agency determines there is "no effect" on a listed species, no further consultation occurs. If the action agency determines that the project "may affect" a listed species, then the agency makes a further finding depending on the degree of effect. If the determination is "may affect, likely to adversely affect" the agencies enter formal consultation and the USFWS writes a Biological Opinion. The USFWS makes a determination of jeopardy or non-jeopardy in the Biological Opinion based on the impacts to the species or population, rather than to an individual.

PROJECT DESCRIPTION

The U.S. Forest Service, Gallatin National Forest, is proposing an amendment to the Forest Land and Resource Management Plan (Forest Plan) to adopt a management plan for public access and travel within the Gallatin National Forest. The proposed Travel Management Plan would identify and establish opportunities for public recreation use and access using the Forest's road and trail system. For each road and trail, it would specify the types of uses for which it would be managed. Specified uses include passenger car pleasure driving, high clearance and off-road vehicle use, motorcycle use, biking, horseback riding, snowmobiling, hiking, skiing and snowshoeing. The Plan will also address off-route travel including area that would be available to snowmobiles. In addition, the Travel Plan would establish goals, objectives, standards and guidelines that provide direction for future management activities related to public access and travel. No vegetative treatment is proposed.

ALTERNATIVE 7-MODIFIED

Alternative 7-Modified (7-M) was the Forest Service "preferred alternative" as of January 2006. It was modified from Alternative 7 through consideration of; the analysis disclosed in the Draft EIS, the recommendations of district rangers and Forest Service specialists, and the comments received on the Draft EIS. The following is a comparison of Alternative 7-M to current travel management.

The total amount of public open system road would remain generally unchanged (approx. 740 miles), however there would be a shift of about 10% of this system from road currently only suitable for high clearance vehicles to road that would accommodate passenger cars. Currently about 325 miles of road are considered suitable for passenger cars, and under Alternative 7-M it would increase to 400 miles. This alternative also includes objectives to close and restore non-system and user-built roads.

ATV opportunities provided on trails would be reduced from 281 miles to 145 miles (about 50%) and motorcycle opportunities on trails would be reduced from 457 miles to 279 miles (about 40%). In general, the reduction in trail opportunity would be shifted to and managed for on administrative and backcountry roads. Currently, many trails (outside of Wilderness) are shared between motorized and non-motorized users.

The amount of area open to snowmobile use (outside of Wilderness) would decrease from about 84% of the Forest to about 53%. In contrast, the miles of marked and groomed trail would rise about 20% from the current situation.

Stock use would generally be allowed on and off-trail although some seasonal and yearlong restrictions would be applied to specific trails.

There would be some restrictions on mountain bikes on trails outside of Wilderness, primarily in the Hyalite/Porcupine-Buffalo Horn WSA and on short routes leading into Wilderness. The trails in Hyalite Creek and the East Fork of Hyalite Creek would remain open to bicycles. Hiking and cross-country skiing would not be restricted.

Alternative 7-M includes Forest-wide and area-specific goals, objectives, standards and guidelines (programmatic direction) and would amend the Forest Plan to replace current direction relative to travel management. In addition to the proposed programmatic direction, travel management under Alternative 7-M would follow current direction applicable to the management of grizzly bear and lynx. At the time of this EIS publication, the applicable direction is based on Memorandums of Understanding (MOU's) and Conservation Agreements with the United States Fish and Wildlife Service (USFWS). See MOU, Conservation Strategy (ICST 2003:12-13), the USFWS Biological Opinion on Access (1995), and Canada Lynx Conservation Agreement (2005).

Grizzly Bear

Under the Grizzly Bear Conservation Strategy MOU (2003), future proposals for roads, trails and other actions relative to travel within the Grizzly Bear Recovery Zone would be governed by the following (further details are available in the Grizzly Bear Issue):

* Within the Grizzly Bear Recovery Zone, proposals to construct or open new motorized routes must be offset by closing other motorized routes such that there will be; no increase in Open Motorized Access Route Density (OMARD) and Total Motorized Access Route Density (TMARD); and no decrease in secure habitat within Grizzly Bear subunits with the following exceptions.

    - A project may decrease secure habitat by 1% of the largest subunit in the Bear Management Unit (BMU). Only one project that affects secure habitat can occur in a subunit at one time, and secure habitat must be restored within one year of the completion of the project.

    - A project may permanently change secure habitat quality provided a replacement of secure habitat of equivalent habitat quality is made in the same subunit. This replacement

habitat must be maintained for a minimum of 10 years and must be in place before project initiation or provided concurrently.

* Maintain the percent of secure habitat in grizzly bear subunits at or above 1998 levels. (Secure habitat is defined as more than 500 meters from an open or gated motorized access route or re-occurring helicopter flight line (3/1-11/30). It must be greater than or equal to 10 acres in size. Replacement secure habitat created to mitigate for loss of existing secure habitat must be of equal or greater habitat value and remain in place for a minimum of 10 years. Large lakes are not included in the calculations.)

* Secure habitat in the subunits "in need of improvement" will be improved above the 1998 baseline (on the Gallatin National Forest these subunits are Gallatin #3, Madison #2, and Henrys Lake #2).

Through an analysis separate from this Travel Plan EIS, the Forest Service has proposed to amend Greater Yellowstone Area Forest Plans (including the Gallatin Forest Plan) to adopt the Grizzly Bear Conservation Strategy (ICST 2003). If and when such decision is made it will supercede the travel management direction above.

Lynx

Under the Lynx Conservation Agreement between the USFS and USFWS (2005), future proposals for roads, trails and other actions relative to travel would be governed by the following:

* Manage over-the-snow routes in accordance with the Lynx Conservation Strategy until superceded by direction forthcoming in the Northern Rockies Lynx Amendment (NRLA 2006) or other direction for lynx habitat management. Baseline snow compaction will be based on the miles of designated over-the-snow routes authorized, promoted, or encouraged in 1998, 1999, or 2000 [as defined in the latest NRLA draft].

Through an analysis separate from this Travel Plan EIS, the Forest Service has proposed to amend Northern Region Forest Plans (including the Gallatin Forest Plan) to establish new direction for the management of lynx (Northern Rockies Lynx Amendment (NRLA) DEIS 2004, NRLA FEIS expected 2006). If and when such decision is made it will supercede the travel management direction above.

Appendix C of this Final EIS provides a general comparison of how Alternative 7-M of this FEIS differs from Alternative 7 of the Draft EIS.

Table I – 1. Summary of Summer Opportunities by Miles – (all mileages are approximate).

Recreation Opportunity	Pleasure Driving	Backcountry Roads (4x4)	ATV	Motorcycle	Mountain Bike (Use Emphasized)	Mountain Bike (Use Allowed))	Pack and Saddle Stock (Use Emphasized)	Pack and Saddle Stock (Use Allowed)	Hiking (Use Emphasized)	Hiking (Use Allowed)
Miles of Road	400	347	389	17	545	1,398	-	-	-	-
Miles of Trail	-	-	145	279	769	400	1767	331**	2,008	149*
Total Miles	400	347	534	296	1,314	1,798	1767	331**	2,008	149*

*Use for this activity is not prohibited on any trails; use is either emphasized or allowed.
** Use for this activity is prohibited on some trails.

Table I – 2. Summary of Winter Opportunities in Miles – (all mileages are approximate).

Recreation Opportunity	Pleasure Driving (Plowed Road)	Snowmobiling	Cross-country Skiing
Miles of Plowed Road	168	-	-
Miles of Groomed Trail	-	346	52
Miles of Marked Trail	-	134	174
Total Miles	167	480	226

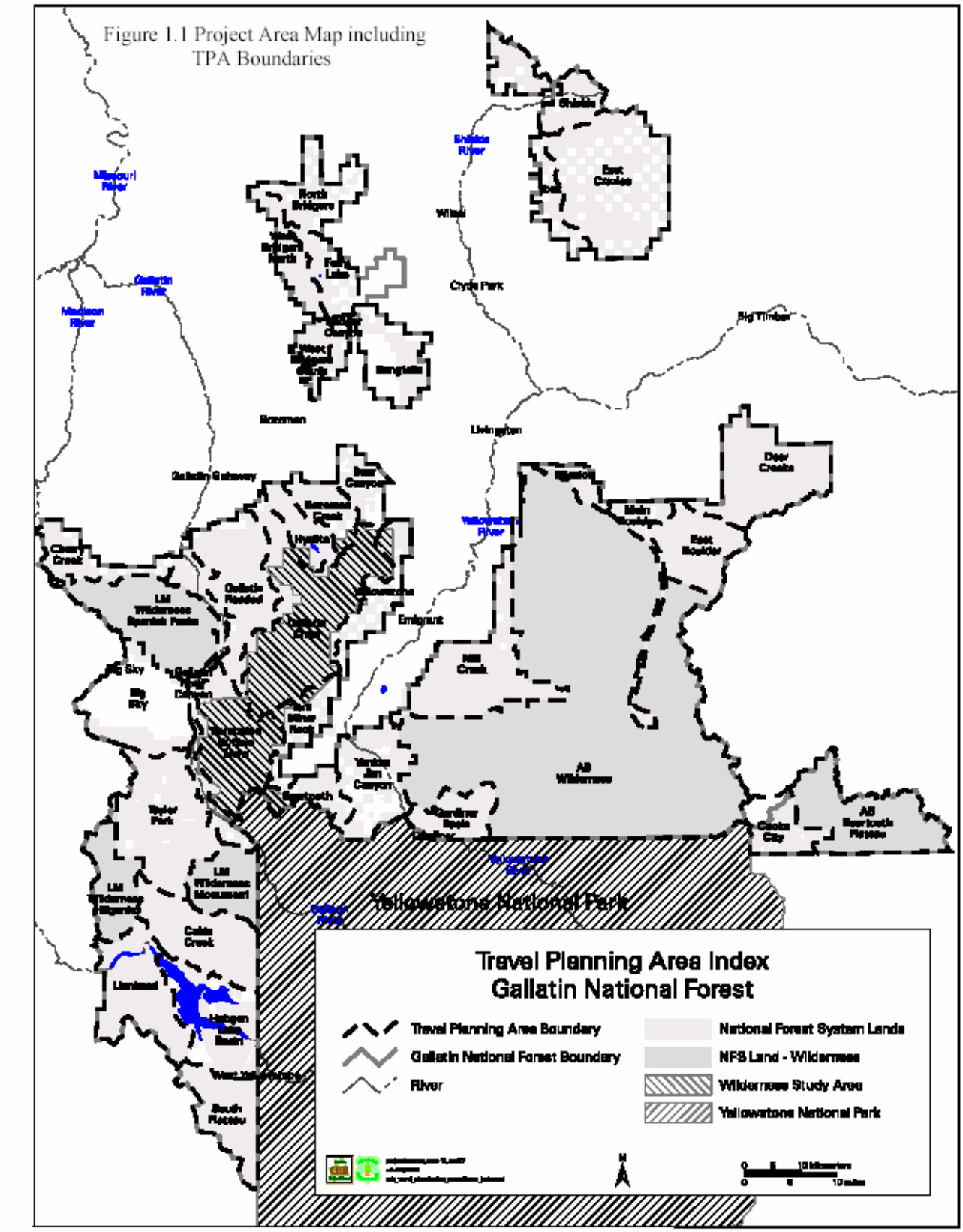


Figure 1.1 Project Area Map including TPA Boundaries
Yellowstone National Park
Travel Planning Area Index
Gallatin National Forest
Travel Planning Area Boundary
Gallatin National Forest Boundary
River
National Forest System Lands
NFS Land - Wilderness
Wilderness Study Area
Yellowstone National Park

DESCRIPTION OF THE ANALYSIS AREA

The analysis area is the entire Gallatin National Forest which consists of approximately 1.8 million acres of National Forest System land and I located along the northern and western boundaries of Yellowstone National Park in southwest Montana. The Forest spans portions of Madison, Gallatin, Park, Meagher, Sweetgrass, and Carbon Counties. Offices are located in the cities of Bozeman, Livingston, Big Timber, Gardiner and West Yellowstone. The Gallatin National Forest includes the Bridger, Bangtail, Crazy, Absaroka, Beartooth, Gallatin, and Madison Mountain Ranges. Major rivers include the Gallatin, Madison, and Yellowstone Rivers.

Included in the Gallatin National Forest are the Lee Metcalf Wilderness Area and the Absaroka-Beartooth Wilderness Area which cover approximately 716,000 acres. Also included are the Cabin Creek Recreation and Wildlife Management Area (approximately 37,000 acres) and the Hyalite/Porcupine-Buffalo Horn Wilderness Study Area (approximately 155,000 acres). In addition to these areas, approximately 704,000 acres of National Forest have been inventoried as roadless. The remaining Forest lands have been mostly roaded and developed for mineral entry and timber production.

FEDERALLY LISTED SPECIES

The listed species known to occur on the Gallatin National Forest include the threatened bald eagle (*Haliaeetus leucocephalus*), grizzly bear (*Ursus arctos horribilis*), and Canada lynx (*Lynx Canadensis*). At this time, grizzly bears are not found on the Forest north of I-90, and we do not consult on the effects of grizzly bears north of I-90, outside of the area where bears occur. The gray wolf (*Canis lupus*) found in this part of Montana is part of the Experimental, Nonessential population and does not need to be addressed in the Biological Assessment, but it is addressed in the NEPA document. There is currently no critical habitat designated for any of these species.

ACTION CONSULTED UPON

The federal action being consulted upon is the Travel Plan for the Gallatin National Forest. The alternative consulted upon is Alternative 7M (7-Modified), which may not be the final preferred alternative in all cases. No alternative will be selected as the final preferred that has effects on threatened or endangered species that are greater than that of Alternative 7M.

HISTORY OF RELEVANT CONSULTATION

February 14, 1986, Gallatin National Forest Plan Biological Opinion, Appendix H of the Forest Plan (all listed species at this time)

January 31, 1995, FWS Addendum to Forest Plan BO (grizzly bear)

February 20, 1996, Forest Plan Amendment 19, Access in the Grizzly Bear Recovery Zone (grizzly bear)

November 30, 1998, Biological Assessment for the Horse Butte Bison Capture Facility - Site A2, Annual Operation from November 1 through April 30, Threatened and Endangered Wildlife, JT Stangl (bald eagle)

July 18, 2000, Consultation on Ongoing Activities in Lynx Habitat (Canada lynx)

2000. BA on effects of Montana Ski Resorts on Canada Lynx.

February 5, 2003. Biological Assessment for Bridger Bowl Ski Area Master Development Plan, Gallatin National Forest, Bozeman Ranger District, Bozeman, MT

January 29, 2002. Final Biological Assessment: The Effects of Snowmobile Use on Grizzly Bears Gallatin, Beaverhead-Deerlodge, Custer, Bridger-Teton and Shoshone National Forests, Greater Yellowstone Area, and May 30, 2002 Biological Opinion (grizzly bear)

March 22, 2004. Biological Assessment for Grizzly Bears that Occur outside of the Yellowstone Recovery Zone on the Gallatin National Forest (grizzly bear)

February 1, 2005, Programmatic Biological Assessment for Activities that are not Likely to Adversely Affect Threatened and Endangered Terrestrial Species on the Beaverhead-Deerlodge, Bitterroot, Custer, Flathead, Gallatin, Helena, Idaho Panhandle, Kootenai, Lewis and Clark and Lolo National Forests, updated in 2006 (all species listed at this time)

History of Consultation on this Project

June 6, 2004 Meeting among M.Cherry and D.Tyers (USFS) and A. Vandehey and K.Dixon (FWS)
July 8, 2004, Meeting of Marion Cherry (USFS), Anne Vandehey and Katrina Dixon (USFWS)
March 8, 2005. Agency Expert Grizzly Bear Meeting, Chuck Schwartz and Mark Haroldson, IGBST, Anne Vandehey and Katrina Dixon, USFWS, Kevin Frey, MFWP, Kim Barber, Shoshone NF, Jim Claar, USFS RO R1, Marion Cherry, Bev Dixon, Andy Pils, Dan Tyers, Rachel Feigley, Steve Schacht, GNF
November 16, 2005 discussion between M. Cherry and A. Vandehey
March 22, 2006, Phone Conservation between M.Cherry and K. Dixon Biological Assessment for the Travel Plan.

RELEVANT MANAGEMENT DIRECTION

All direction related to access or travel management in the 1987 Forest Plan will be deleted, and new direction in this Travel Plan will take its place. Direction related to threatened or endangered species that will stay in place includes:
Forest Plan Goal 8. Provide sufficient habitat for recovered populations of threatened and endangered species (i.e., grizzly bear, bald eagle, and peregrine falcon). (FP, p. II-1)
Goal 9. Strive to prevent any human-caused grizzly bear losses. (*Ibid*.)
Forest-Wide Standards

6.b.1. A Biological Assessment will be completed prior to implementation of projects that have the potential to affect listed species. Formal consultation with the USFWS will occur if a "may affect, likely to adversely affect" is determined (p. II-19).
6.b.2. The Grizzly bear standards and guidelines in Appendix G will be followed.
6.b.3. Management direction for the bald eagle and its habitat is found in *A Bald Eagle Management Plan for the Greater Yellowstone Ecosystem*.
Management Areas 13, 14, and 15 have some specific management goals for wildlife. They include:

1. Manage vegetation to provide habitat necessary to recover the grizzly bear.
2. Meet grizzly bear mortality reduction goals as established by the IGBC. (pp. III-40, 44, 47)

And allow some other uses consistent with goal #1.
Direction not related to access or travel management that is within Appendices G and H will continue to be followed until or unless the Forest Plans are amended with the Conservation Strategy for Grizzly Bears in the Yellowstone Area.

The Canada lynx was listed as threatened in March 2000, after the Forest Plan direction was created. Guidance for lynx is provided in the August 2000 Canada Lynx Conservation Assessment and Strategy (Reudiger et al.).

In addition, much has been learned about grizzly bears since the Forest Plan was written. That and the increase in the bear population in the Yellowstone Area led to the creation of a document called the *Final Conservation strategy for the grizzly bear in the Yellowstone Ecosystem* that was developed by the Interagency Conservation Strategy Team and finalized in March 2003. The three Regional Foresters managing Forests in the Greater Yellowstone Area, the three Directors of State Fish and Game agencies and Bureau of Land Management signed a Memorandum of Understanding (ICST 2003:12-13) to seek implementation of the Grizzly Bear Conservation Strategy. The Conservation Strategy is currently undergoing a NEPA process that will amend it to the Forest Plans of Forests in the Yellowstone area and will replace most, if not all, of their current Forest Plan direction for grizzly bears after the grizzly bear is delisted.

Because it is likely that the Conservation Strategy (ICST 2003) will supercede the Gallatin National Forest Plan direction and for grizzly bear access via amendment to the Forest Plan, the Conservation Strategy (*Ibid.*) direction was used in this issue to assess the effects of travel management on grizzly bears. The 1995 Biological Opinion and Amendment #19 to the Forest Plan stated that the Gallatin National Forest was to adopt Yellowstone access standards when they became available. The Conservation Strategy makes these standards available.

The Conservation Strategy direction will be followed. This direction applies only to the Recovery Zone (Primary Conservation Area). There are three subunits designated as needing improvement: Henrys Lake #2, Gallatin #3 and Madison #2. These lie at least partially on the Gallatin National Forest

The following direction is excerpted from Chapter 2 for grizzly bear under Alternative 7M.

Under the Grizzly Bear Conservation Strategy MOU (2003), future proposals for roads, trails and other actions relative to travel within the Grizzly Bear Recovery Zone would be governed by the following (further details are available in the Grizzly Bear Issue):

* Within the Grizzly Bear Recovery Zone, proposals to construct or open new motorized routes must be offset by closing other motorized routes such that there will be; no increase in Open Motorized Access Route Density (OMARD) and Total Motorized Access Route Density (TMARD); and no decrease in secure habitat within Grizzly Bear subunits with the following exceptions.

- A project may decrease secure habitat by 1% of the largest subunit in the Bear Management Unit (BMU). Only one project that affects secure habitat can occur in a subunit at one time, and secure habitat must be restored within one year of the completion of the project.

- A project may permanently change secure habitat quality provided a replacement of secure habitat of equivalent habitat quality is made in the same subunit. This replacement habitat must be maintained for a minimum of 10 years and must be in place before project initiation or provided concurrently.

* Maintain the percent of secure habitat in grizzly bear subunits at or above 1998 levels. (Secure habitat is defined as more than 500 meters from an open or gated motorized access route or re-occurring helicopter flight line (3/1-11/30). It must be greater than or equal to 10 acres in size. Replacement secure habitat created to mitigate for loss of existing secure habitat must be of equal or greater habitat value and remain in place for a minimum of 10 years. Large lakes are not included in the calculations.)

* Secure habitat in the subunits "in need of improvement" will be improved above the 1998 baseline (on the Gallatin National Forest these subunits are Gallatin #3, Madison #2, and Henrys Lake #2).

Through an analysis separate from this Travel Plan EIS, the Forest Service has proposed to amend Greater Yellowstone Area Forest Plans (including the Gallatin Forest Plan) to adopt the Grizzly Bear Conservation Strategy (ICST 2003). If and when such decision is made it will supercede the travel management direction above.

The following are new Travel Plan Goals, Directions, Standards or Guidelines that are relevant to threatened and endangered species and other wildlife. These are Forest-wide for the action alternatives.

STANDARD A-8. Off-Route Travel. "Wheeled motorized vehicle travel shall be prohibited off of designated routes with the following exceptions:

- Wheeled motorized cross-country travel may be allowed in designated firewood gathering areas.
- Wheeled motorized cross-country travel may be allowed for any military, fire, search and rescue or law enforcement vehicle for emergency operations subject to authorization from a line officer.

- Wheeled motorized vehicle travel will be allowed to access a campsite within 300'of a designated road or trail unless specifically restricted or unless such use would result in damage or unreasonable disturbance to land, wildlife or vegetative resources.
- Wheeled motorized cross-country travel for lessees and permittees may be allowed but limited to the administration of a federal lease or permit. Authorization by a line officer is required.
- Wheeled motorized cross-country travel is allowed for Forest Service employees and contractors conducting official authorized business.
- Motorized wheeled cross-country travel may be allowed for other government entities and contractors on official administrative business subject to authorization from a line officer."

GOAL D. Resources (General). "Manage a system of roads and trails and associated use that is consistent with Forest Plan goals for water quality; wildlife habitat; fish habitat; threatened and endangered species recovery; and historical resources (Note: Until Forest Plan revision refer to Forest Plan (9/87), pages II-1, II-2, and Amendment 19)."

OBJ. D-1. Road Rehabilitation. "Close and rehabilitate existing roads that are in excess to administrative, recreation and access needs."

OBJ. D-2. Trail Rehabilitation. "Close and rehabilitate existing non-system trail not otherwise designated for public travel."

STANDARD D-5. Project Roads. "Existing roads that were constructed for project use and not designated for motorized use via the Forest Travel Plan are to remain closed to public motorized use."

STANDARD D-6. Wildlife. "There shall be no increase in public motorized routes within any travel planning area beyond those identified through this Travel Management Plan without amendment."

GOAL E. Water Quality, Riparian, Fisheries and Aquatic Life. "Manage a road and trail system that fully supports the protection of water quality, and habitat for fish, riparian dependent species and other aquatic organisms." There are many objectives, standards and guidelines under this goal that are beneficial to all wildlife.

GOAL F. Wildlife Corridors. "Provide for wildlife movement and genetic interaction (particularly for wide-ranging species) between and within mountain ranges throughout the Gallatin National Forest and connecting wild lands."

OBJ. F-1. Wildlife Corridors. "Provide habitat connectivity consistent with wildlife movement patterns between mountain ranges such as that at Bozeman Pass (linking the Gallatin Range to the Bridger/Bangtails); the North Bridgers (linking the Bridger Range to the Big Belt Mountains; the Lionhead area (linking the Henry's Lake Mountains to the Gravelly Mountains); the Shields (Crazy Mountains to the Castle and Little Belt Mountains) and other such areas.

GOAL G. Threatened, Endangered and Species of Special Management Designation. "Manage human use of the Forest road and trail system that allows for the recovery of threatened and endangered species and maintains species of special management designation and their habitats."

GUIDELINE G.10 T&E Species. Consider applying temporary localized restrictions on activities on the Forest where needed to prevent conflicts with T&E species.

GOAL H. Wildlife. "Protect key habitats such as willow, riparian, wetlands, whitebark pine, old growth, snags and down woody debris, ridgelines, saddles, and forest/ non-forest ecotones from damage or depletion associated with forest travel management."

OBJECTIVE H-1. Wildlife. Relocate, reconstruct or take other appropriate action (such as informational signing) on system roads and trails that are found to have adverse impacts on key habitats.

GUIDELINE H-2. Wildlife. Roads or trails that are constructed for motor vehicle use should be located such that construction and use do not result in adverse impacts to key habitats, or should be designed so as to mitigate for adverse effects in areas where impacts to key habitats cannot be avoided via the route location. *Note that construction of roads and trails for public motorized use on routes not designated for that use in this Travel Plan is not permissible. Modification of the Travel Plan following analysis in compliance with NEPA and other applicable laws is required to designate new routes for public motorized travel.*

GUIDELINE H-3. Wildlife. Adverse impacts to key habitats will be a priority factor in the scheduling of closure for project roads and undesignated routes.

GOAL I. Wildlife. "Provide high quality security habitat in areas important to wildlife reproduction (e.g. calving, fawning, denning and nesting habitat) and wintering areas, including ungulate winter range

OBJ. I-1. Wildlife. "Minimize stress factors from human recreation use to species of management concern during calving, fawning, denning and nesting seasons in habitats used for reproduction."

GUIDELINE I-2. Wildlife. "In the management of winter travel consider Montana FWP goals for achieving optimal ungulate survival rates on big game winter range."

BALD EAGLE

STATUS, HABITAT USE, AND BEHAVIOR

The information in this section of the BA is taken from the 2005 programmatic Biological Assessment for activities that are not likely to adversely affect listed terrestrial species in Montana.

Distribution

The bald eagle (*Haliaeetus leucocephalus*) historically ranged throughout North America except extreme northern Alaska and Canada, and central and southern Mexico. Prior to 1940, the eagle population began to decrease. This decrease was directly related to the decline in number of prey species, as well as direct killing and loss of habitat. In 1940, the Bald Eagle Protection Act was passed. The law made it illegal to kill, harm, harass, or possess bald eagles, alive or dead, including eggs, feathers, and nests. As a result of passing this law, the bald eagle began to partially recover (USDI 1996a). The bald eagle was listed as endangered in Montana in 1978. It was reclassified as threatened in 1995.

Subsequent to World War II, the use of dichloro-diphenyl-trichloroethane (DDT) to control mosquitoes became very widespread along coastal and wetland areas. Organochlorides had a drastic affect on bald eagles; as a result of foraging on contaminated food, populations plummeted. It was determined in the late 1960s and early 1970s that DDE, the principle breakdown product of

DDT, built up in the fat tissues of adult females. This prevented calcium release necessary to produce strong eggshells, and caused reproductive failure from eggshell thinning (USDI 1996a).

The Secretary of the Interior, on March 11, 1967, listed bald eagle populations south of the 40th parallel endangered under the Endangered Species Preservation Act of 1966. However, the decline continued until DDT was banned from use in the United States on December 31, 1972. Bald eagles were listed endangered under the ESA in 1973. From 1973 through 1995 bald eagles were listed as endangered, but due to cooperative efforts by government agencies and public and private non-government organizations, populations have increased and in 1995 it was down-listed to threatened status.

The bald eagle is presently listed threatened in Idaho, Montana, and North Dakota, but is currently proposed for de-listing (USDI 1996a)

Life History

Bald eagles are in the family *Acciptiridae*. In the adult plumage, the head, neck, tail, and upper and lower tail coverts are white. The remainder of the plumage is dark brown. The bill, cere, iris, and feet are yellow, and the tarsus is featherless. Juveniles and sub-adult plumages are mainly brown, including the head and tail. White or buff mottling is extensive in some individuals, particularly in the under-wing coverts, tail, and abdomen. The bill and cere of the immature are dark brown or gray, the iris is brown, and the feet are yellow. Adults reach sexual maturity at four to six years of age (full adult plumage appears with sexual maturity). Bald eagles are monogamous and believed to mate for life. If a mate is lost a new pair bond is formed, often in the same breeding season (USDI 1996a).

Bald eagles nest almost exclusively in live trees usually within one mile in line of sight of a large river or lake. In Montana, courtship begins in January; egg laying is initiated in early February or as late as mid-April. Alternate nest sites are typically present in the breeding area and most frequent clutch size is two (range of one to three eggs). Incubation spans 31 to 35 days and may be influenced by ambient temperatures. Young hatch from mid-March to mid-May and nestling period lasts from 11 to 14 weeks; once fledged, young are dependent on adults for six to ten weeks (Montana Bald Eagle Working Group – MBEMP - 1994).

Although some nesting pairs remain in Idaho, Montana, and North Dakota year-round, the winter population is generally composed of migrants from Canada (Magaddino 1989). Winter habitat is generally associated with areas of open water where fish and waterfowl congregate (Stalmaster 1987). Perching and roosting trees are typically dominant mature conifers or cottonwoods providing a good view of the area (Magaddino 1989). Bald eagles use perches during the day while hunting, feeding, or resting; roosts are used at night or for protection during bad weather and may be occupied by one to several hundred bad eagles; roost sites, like nest sites, are used year after year (ibid).

The bald eagle is an opportunistic predator and feeds primarily on fish, but also consumes a variety of birds and mammals (both dead and alive) when fish are scarce or these other species are readily available. Fish may comprise up to 90 percent of the diet (70 percent to 90 percent) depending on

geographic location, season, and relative abundance. Carp, suckers, salmon, and trout are important fish species preyed on by bald eagles. Bird prey species are more important in bald eagle diets during winter when fish are less available due to ice formation on streams, lakes, and reservoirs. Waterfowl are the most common bird species preyed on by eagles. Mammals are taken at a lesser degree than fish and birds. Mammals are taken as live prey or carrion in all seasons, but become more important during winter (USDI 1996a).

Threats to Bald Eagles

The environmental baseline for bald eagles is described in terms of those parameters that threaten bald eagles because of human activity and development that disturbs and/or displaces bald eagles or because of vegetation management that may reduce available habitat. In addition, bald eagle nest baseline data will be determined during the annual bald eagle nest survey.

Human Activity and Development

Bald eagles are sensitive to a variety of human activities and development and may either temporarily or permanently abandon an area (Mahaffy and Frenzel 1987, Buehler et al. 1991, McGarigal et al. 1991). Disturbances at nest sites can lead to lowered productivity and site desertion (Anthony and Isaacs 1989); disturbances at foraging areas can interfere with an eagle's ability to meet its energetic demands (McGarigal et al. 1991, Stalmaster and Kaiser 1998).
However, bald eagles vary in their response to various human activities. The response is often site, pair, and activity specific and is a function of type, intensity, and proximity of the disturbance (MBEMP 1994).

Vegetation Management

Bald eagles nest in a variety of habitats. They usually build nests on prominent landscapes in large trees in close proximity to aquatic foraging areas (Wright and Escano 1986, Anthony and Isaacs 1989). Timber harvest activities can modify bald eagle nesting habitat. The large, mature trees preferred by bald eagles are also preferred as timber products. Anthony and Isaacs (1989) found that bald eagles selected forest stands where logging activities were limited.

Winter roosts are often located in forest stands that have some old growth characteristics. Vegetation management may also affect winter roosts; however availability of nearby roosting sites reduces impacts (U.S. Army Corp of Engineers 1979).

EFFECTS ON BALD EAGLES

Analysis area

Although the Forest Travel Plan affects the entire Forest, the area used to analyze the impacts of travel planning on bald eagles was the Hebgen Basin and Lionhead Travel Planning Areas (TPAs), because these are the only known areas used by nesting bald eagles on the Forest, and effects of human activities on eagle productivity are not expected outside this area. Nest sites were plotted and buffered by 400 meters and 800 meters. They were then displayed with Travel Plan alternatives

to allow an assessment of travel within Zones I and II of each nest. Both winter and summer travel routes were included, along with open motorized and non-motorized travel routes and area closures.

Winter Travel

Horse Butte Territory
Under this alternative a snowmobile closure would be implemented along the Madison Arm of Hebgen Lake and the Madison River. Open water can be found on the Madison Arm of Hebgen Lake during the early nesting season, and the Horse Butte eagles have been documented to use this area heavily for perching and foraging at this time of the year (Stangl 2000:IV-13). This would provide greater area for the Horse Butte pair to forage in without disturbance from snowmobiles. This will help meet the intent of the GYBEMP guidelines for management of Zones II and III, which recommend that light and moderate activity levels not be exceeded. It would also largely meet the recommendation made by Stangl (2000, page VI-8) to restrict snowmobile use adjacent to the Madison Arm.

Ridge and Narrows Territories

Impacts to nesting bald eagles in these territories from snowmobile use would be similar to those described for the Horse Butte territory. An important exception is that these nests would have no area closure for Zone I, as the Horse Butte territory would. Snowmobile use off the groomed trail regularly occurs through much of Zone I around both territories through late March, and this would continue under these alternatives. There would be high potential for disturbance of nesting birds during the part of the nesting season when they are most sensitive to disturbance. The Narrows birds appear to be highly tolerant of snowmobile use and the effects of snowmobile use under these alternatives would have minimal effects on them. The Ridge birds may be more sensitive to disturbance from snowmobile use, and they could continue to exhibit lower than average productivity under these alternatives. GYBEMP guidelines recommending that minimal activity levels not be exceeded within Zone I would not be met for either territory under this alternative. Recommendations for restricting snowmobile use within these territories from Stangl (2000:VI-8) would also not be met.

Moonlight Territory

Winter travel within the management zones of this territory would be managed the same under all alternatives. Snowmobiles would continue to use Forest Road #176 within Zones I, II and III. This road does not lead to any destination snowmobiling areas, and therefore snowmobile traffic is lighter than in many other places around Hebgen Lake that are open to snowmobiling. Also, snowmobile use off the road is discouraged by forest cover in most places. It is likely that this pair has become habituated to snowmobile traffic, and that this would continue to be the case under these alternatives. Effects of snowmobile use would be minor.

Canyon Territory

Zones I, II and III would be open to snowmobile use under these alternatives. However, Zone I is inaccessible by snowmobiles due to the steep terrain. The terrain in portions of Zones II and III is

technically accessible, but the area is not a snowmobile destination and receives only very light use, which is expected to continue. Additionally, any disturbance from winter travel would occur across Earthquake Lake from the nest where impacts to nesting and foraging eagles would be very limited. GYBEMP guidelines would be met in all management zones under these alternatives, given the infrequent snowmobile use the area receives.

Halford Camp

Under this alternative, there would be a designated snowmobile route within Zone II of this territory. However, off-trail snowmobile use would be prohibited in the surrounding area. Snowmobile use would continue to be so low that the effects to bald eagles would be discountable.

Summer Travel

Horse Butte Territory

Summer travel in the management zones for this territory would be the same under all alternatives, and would be the same as the existing condition. Forest Roads #610, #6697 and the Horse Butte Lookout Road would continue to facilitate heavy recreational use (fishing, boating, picnicking, sight-seeing, and numerous other recreational activities) within all management zones of this territory, including important foraging and perching areas. Disturbance to nesting eagles in Zone I would be minimized by continued implementation of the existing 75-acre closure. GYBEMP guidelines for recommended human activity levels within Zones I, II and III would be exceeded. However, eagles would have more options for foraging places by the time the road system opened for motor vehicle use in early May, compared to winter, because ice cover would be rapidly receding on Hebgen Lake.

Ridge Territory

Summer travel in the management zones for this territory would be the same under all alternatives, and would be the same as the existing condition. Forest Road #610 would continue to facilitate heavy summer recreational use (fishing, boating, picnicking, sight-seeing, and numerous other recreational activities) within Zones II and III of this territory, including important foraging areas. Zone I would have no travel routes other than a two-track project road that would be closed to public use. Some illegal use of this road would be expected because of the open, gentle terrain, but it is uncertain how frequently violations would occur and therefore how much disturbance to the nesting eagles there would be.

Narrows Territory

Forest Road 32530 would be managed for project use under this alternative. The least amount of disturbance to the Narrows bald eagles from summer travel would occur under this alternative.

Moonlight Territory

Management of summer travel and resulting effects to the Moonlight territory eagles would be the same under all alternatives. Forest Road #167 is within Zones I, II and III. This is a main access road for the west side of Hebgen Lake, and it receives substantial use from recreationists and summer homeowners along the lake. Disturbance levels from motorized vehicle use on the road would exceed GYBEMP guidelines for Zones I and II. However, the road was constructed and had been used many years before the territory was established, and this pair has been among the most productive on Hebgen Lake. It is likely that this pair has become habituated to traffic along the road, and that this would continue to be the case. Recreational use along the lake facilitated by summer travel would be more likely to disturb nesting birds, but under all alternatives, there would be no motorized access routes leading directly to the lake in the vicinity of the Moonlight nest. Effects to nesting bald eagles from summer travel in this territory would be continue to be minor.

Canyon Territory

Summer travel in Zones I, II and III are the same under all alternatives. The only motorized travel routes are within the Beaver Creek Campground, in Zones II and III. This pair established their territory here long after the campground was developed and used. The routes are on the opposite side of Earthquake Lake from the nest, and would contribute little disturbance to foraging eagles because they are positioned on a bench above the lake and far enough back from the bank. Additionally, the roads do not open to motorized traffic until late May when the campground opens, by which time eagle sensitivity to disturbance decreases (Montana Bald Eagle Working Group:22). Therefore, the effects of summer travel would be minor.

Halford Camp

Summer travel in Zones I, II and III is the same under all alternatives. There are no summer travel routes within Zone I. The Campfire Lodge Road continues to provide access for a large number of summer recreational users (mostly anglers) to Zones II and III, and the administrative road to the Crazy House would be heavily used for foot access to Earthquake Lake in Zones II and III. Zone I of the territory would be free of disturbance related to summer travel, but some disturbance to foraging eagles in Zones II and III would result. Because this territory has only been monitored for one year, this pair's tolerance of human disturbance is difficult to assess. GYBEMP guidelines for managing disturbance within bald eagle territories would be met for Zone I, but exceeded for Zones II and III.

Cumulative Effects

Net Effects of Past and Present Programs and Activities

A variety of human activities that could cause disturbance to nesting and foraging eagles other than travel on Forest Service lands occur within the analysis area (see cumulative effects worksheet for bald eagle issue in project record). These activities undoubtedly influence the way bald eagles use available habitat, leading to reduced foraging efficiency and periodic disturbance to nesting birds in most known bald eagle territories within the analysis area.

Projected Combined Effects of Reasonably Foreseeable Programs and Activities

The effects of most activities on bald eagles in the analysis area are expected to remain relatively constant in the foreseeable future, with the exception of dispersed recreation. This is an important source of disturbance for many territories within the analysis area. Therefore, it is likely that the cumulative disturbance of human activity to nesting and foraging bald eagles will continue to increase within the analysis area.

Cumulative Effects of Past, Present and Reasonably Foreseeable Programs and Activities with the Travel Plan Alternatives

Under Alternative 7M, snowmobile use would probably be the most prevalent source of disturbance to bald eagles in the analysis area during the early nesting period, and would therefore contribute substantially towards cumulative effects on bald eagles. During the snow-free season, dispersed recreational activities such as fishing and boating are probably equally important sources of disturbance to nesting and foraging bald eagles relative to summer travel. These effects may be less important than winter travel because they occur later in the nesting season, when sensitivity to disturbance decreases.

Productivity trends for bald eagles within the analysis area have been consistent with those from an increasing population despite the large amount of human activity occurring throughout much of the analysis area (Figures 1, 2, and 3). An increasing trend in the number of occupied nests within the analysis area is readily apparent. The number of chicks fledged per nest averaged 1.1 during the period 1977-2005, which is consistent with the value of 1.05 reported for the entire Greater Yellowstone bald eagle population (Greater Yellowstone Bald Eagle Working Group 1996, page 7) and exceeds the national Recovery Plan objective of 1.0 young per occupied breeding area (Montana Bald Eagle Working Group 1994, page 15). Some eagles may become tolerant of human activities (Stalmaster and Kaiser 1998, page 40), and this is likely the case for many of the pairs within the analysis area. Bald eagles within the analysis area should continue to exhibit characteristics of a productive population until it nears biological carrying capacity under these alternatives. As recreational activities increase within the analysis area it is possible that a threshold may be reached where cumulative disturbance increases beyond the tolerance levels of most birds. Productivity could begin to decline under this scenario, but it is unknown how much increase in human activity would be necessary before that threshold is reached.

Figure 1. Number of known occupied bald eagle nests on Hebgen and Earthquake Lakes from 1976-2005.

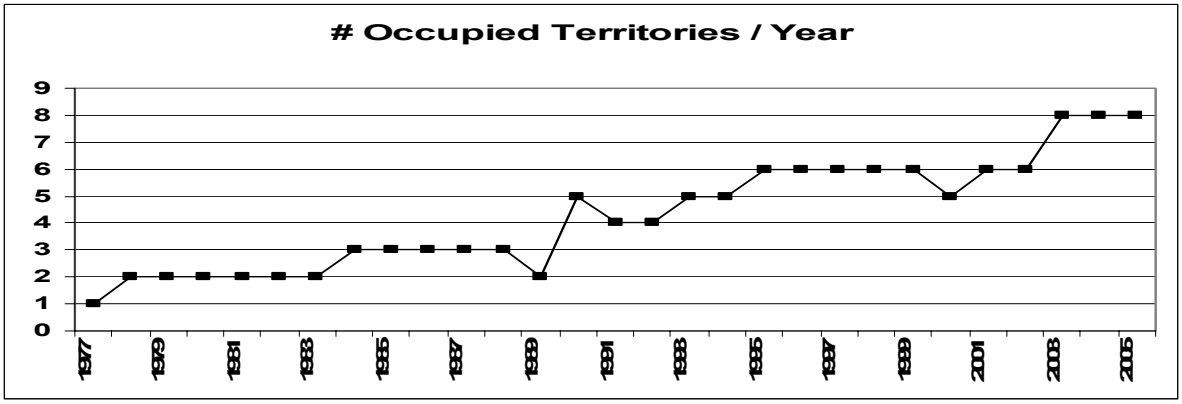


Figure 2. Number of bald eagles fledged on Hebgen and Earthquake Lakes from 1976-2005.

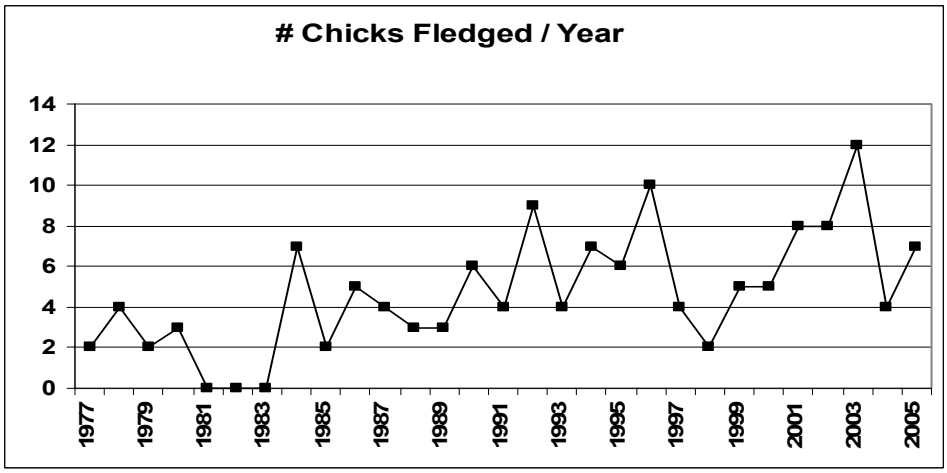
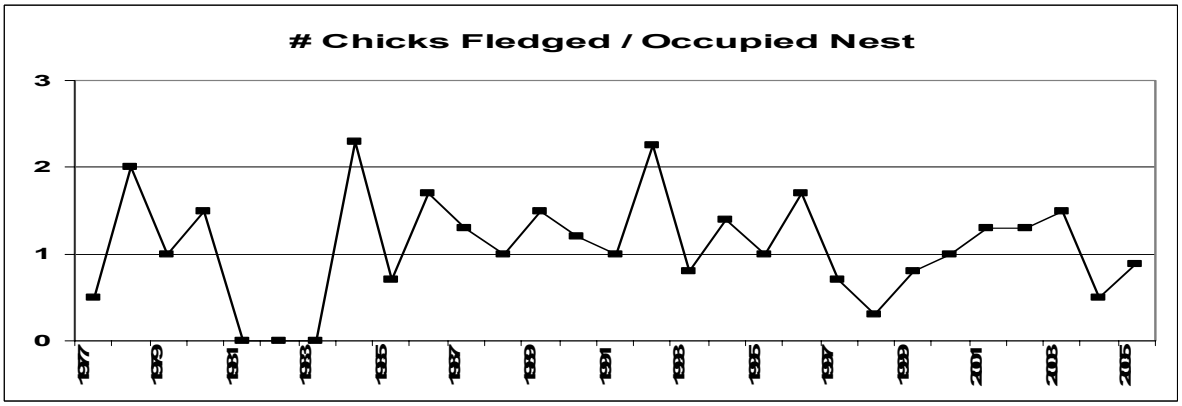


Figure 3. Number of bald eagles fledged per occupied nest on Hebgen and Earthquake Lakes from 1976-2005.



Determination of Effects

For the bald eagle, the determination for the effects of Alternative 7M is "may affect, likely to adversely affect" the bald eagle. A determination of "may affect, likely to adversely affect" is made if the Greater Yellowstone Bald Eagle Management Plan guidance cannot be met.

In the winter, the Horse Butte nest is fairly well protected from disturbance. The Ridge and Narrows nests, however, have no area closure for Zone I, as the Horse Butte territory does. Snowmobile use off the groomed trail regularly occurs through much of Zone I around both territories (Ridge and Narrows) through late March, and this would continue under 7M. There would be high potential for disturbance of nesting birds during the part of the nesting season when they are most sensitive to disturbance. The Narrows birds appear to be highly tolerant of snowmobile use and the effects of snowmobile use under these alternatives would have minimal effects on them. However, the Ridge birds may be more sensitive to disturbance from snowmobile use, and they could continue to exhibit lower than average productivity under Alternative 7M. GYBEMP guidelines recommending that minimal activity levels not be exceeded within Zone I would not be met for either the Ridge or Narrows territories under 7M. Recommendations for restricting snowmobile use within these territories from Stangl (2000:VI-8) would also not be met. Winter effects to the Moonlight, Canyon and Halford nests are minimal.

Most of the nest sites are less subject to serious disturbance in the summer. For the Moonlight nest, disturbance levels from motorized vehicle use on the road would exceed GYBEMP guidelines for Zones I and II. However, the road was constructed and had been used many years before the territory was established, and this pair has been among the most productive on Hebgen Lake. For the Halford Camp nest, GYBEMP guidelines for managing disturbance within bald eagle territories would be met for Zone I, but exceeded for Zones II and III.

The bald eagle has met its recovery criteria and is nearing being removed from protection under the Endangered Species Act. Bald eagles have dramatically increased in the number of nests known in Montana. If delisted, bald eagles will continue to have protected status under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. Bald eagles will continue to receive protection under the Forest Plans as sensitive species or some other designation. Monitoring will help assure continued recovery of this species.

Coordination Measures

Continue to monitor bald eagle nest productivity annually.

Expected Future Status

The bald eagle has met its recovery criteria and is nearing being removed from protection under the Endangered Species Act. Bald eagles have dramatically increased in the number of nests known in Montana and in the Greater Yellowstone Area. Delisting of this species should occur soon. At that time, bald eagles will continue to have protected status under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. Bald eagles will continue to receive protection under the

Forest Plans as either sensitive species or some other designation. Monitoring will help assure continued recovery of this species.

GRIZZLY BEAR

STATUS, HABITAT USE, AND BEHAVIOR

The following indented information, on grizzly bear distribution and life history, is excerpted from the draft *Programmatic Biological Assessment for Activities Not Likely to Affect Listed Terrestrial Species* (USDA Forest Service 2005).

Distribution

The historic range of the grizzly bear (*Ursus arctos horribilis*) in the continental United States extended from the central Great Plains, west to California, and south to Texas and Mexico. Between 1800 and 1975, grizzly bear populations in the lower 48 states declined from over 50,000 to less than 1,000. As European settlement expanded westward, the grizzly was extirpated from most of its historical range.

Five areas in the lower 48 states currently support grizzly bear populations; these areas are located in Montana, Wyoming, Idaho, and Washington and include: the Yellowstone Ecosystem, Northern Continental Divide Ecosystem, Cabinet-Yaak Ecosystem, Selkirk Ecosystem, and Northern Cascades Ecosystem. These areas represent less than two percent of the grizzly's former range (USDI 1993).

The grizzly bear was listed as threatened under ESA in 1975 (USDI 1993).

Life History

Grizzly bears are in the bear family (*Ursidae*) and are generally larger than black bears and can be distinguished by having longer front foot claws (two to four inches), a distinctive shoulder hump (muscle mass for digging), rounded ears that are proportionately smaller than the head, and a dished-in profile between the eyes and end of the snout. A wide range of coloration from light brown to nearly black is common. Guard hairs are often paled at the tips; hence the name "grizzly." Spring shedding, new growth, nutrition, and climate all affect coloration. In the continental United States, the average weight of grizzlies is 400 to 600 pounds for males and 250 to 350 pounds for females. Grizzly bears are long-lived and many individuals live over 20 years. Adult bears are individualistic in behavior and normally are solitary wanderers. Females with cubs and bears defending food supplies are common causes of confrontation between humans and bears (USDI 1993).

Home ranges of adult bears may overlap. The home ranges of adult male grizzlies are generally two to four times larger than adult females. The home ranges of females are smaller while they have cubs, but increase when the cubs become yearlings. Home ranges vary in relation to food availability, weather conditions, and interactions with other bears. Home ranges are larger in the

Yellowstone Ecosystem compared to the more productive habitats in the northern ecosystems (USDI 1993).

Age of first reproduction and litter size varies and may be related to nutritional state. Age at first reproduction averages five and one-half years of age (three and one-half to eight and one-half years of age). Reproductive intervals for females average three years and litter size average two cubs (one to four cubs per litter). The limited reproductive capacity of grizzly bears precludes rapid increases in population. Grizzly bears have one of the lowest reproductive rates among terrestrial mammals. During a female's lifetime, if she has litters of two cubs with a 50:50 sex ratio, and a 50 percent survivorship of young to age 5.5 years, at best she can replace herself with one breeding age female in the first decade of her life (USDI 1993).

Coniferous forest cover is very important to grizzly bears. Ninety percent of aerial radio relocations of 46 radio-collared grizzlies were in forest cover too dense to observe the bear. Dense forests are important for thermal cover, hiding cover, and day beds; most beds are located within six feet of a tree. The importance of open grassy parks with coniferous forest cover has also been documented (USDI 1993).

Grizzly bears excavate dens as early as September or prior to den entry in November. Dens are usually dug on steep slopes where wind and topography cause an accumulation of deep snow and where snow is unlikely to melt during warm periods. Dens are generally found at high elevations well away from human activity and development (USDI 1993).

Grizzly bears are opportunistic feeders and will prey or scavenge on almost any available food. Plants with high crude protein content and animal matter are important food items. The search for food has a prime influence on grizzly bear movements. Upon emergence from the den grizzlies move to lower elevations, drainage bottoms, avalanche chutes, and ungulate winter ranges where their food requirements can be met. Throughout spring and early summer grizzlies follow plant phenology back to higher elevations. In late summer and fall, there is a transition to fruit and nut sources, as well as herbaceous materials. This is a general pattern; however, bears will go where they can meet their food requirements (USDI 1993).

The environmental baseline for grizzly bears is described in terms of those parameters that threaten grizzly bears either through human contact and conflict or through reductions in secure habitat. More specifically, parameters that address grizzly/human conflict (e.g. access management, appropriate food storage, and livestock) and vegetation management form the basis against which threats to grizzly bears are measured.

The historic range of the grizzly bear (*Ursus arctos horribilis*) in the continental United States extended from the central Great Plains, west to California, and south to Texas and Mexico. Between 1800 and 1975, grizzly bear populations in the lower 48 states declined from over 50,000 to less than 1,000. As European settlement expanded westward, the grizzly was extirpated from most of its historical range.

Five areas in the lower 48 states currently support grizzly bear populations; these areas are located in Montana, Wyoming, Idaho, and Washington and include: the Yellowstone Ecosystem, Northern

Continental Divide Ecosystem, Cabinet-Yaak Ecosystem, Selkirk Ecosystem, and Northern Cascades Ecosystem. These areas represent less than two percent of the grizzly's former range (USDI 1993). Grizzly bears in the Yellowstone Area have met recovery criteria.

The grizzly bear was listed as threatened under ESA in 1975 (USDI 1993).

EFFECTS ON GRIZZLY BEARS

Introduction

The issue of travel management is important to the conservation of the grizzly bear, a species currently listed as threatened under the Endangered Species Act. The grizzly bear is known to be sensitive to the effects of access management, especially as related to motorized use. Grizzly bears tend to avoid areas used by motorized vehicles (McClelland and Shackleton 1988, Kasworm and Manley 1989, Mace et al. 1996, Wieglus et al. 2002). This section addresses the potential effects of summer motorized use and winter motorized use on grizzly bears. There are more studies of the effects of motorized use on bears than of non-motorized use. Because of this, the effects of non-motorized use are discussed in less detail.

Affected Environment

Background on Motorized Access and Grizzly Bears on the Gallatin National Forest

In general, grizzly bears occur throughout that portion of the Gallatin National Forest south of Interstate 90. In 1996, the Gallatin National Forest amended the Forest Plan for Access in the Grizzly Bear Recovery Zone (Amendment #19). This Amendment was intended to bring motorized access management on the Forest more in line with current science, and removed much of the previous access management direction related to grizzly bears from the Gallatin Forest Plan (USDA 1987) in relation to grizzly bears. The basis of the amendment was a 1995 Biological Opinion from the US Fish and Wildlife Service (USDI 1995). The crux of Amendment 19 is that the Forest would manage human motorized access in the Recovery Zone (Primary Conservation Area, ICST 2003) to help meet the goal of grizzly bear recovery. Standards would be to adopt Yellowstone Park access standards when they become available. In the interim, the Forest would manage bear subunits (unless allowed through consultation with the US Fish and Wildlife Service) for:

1) No increase in open motorized access route density (OMARD) from the current level.
2) No increase in total motorized access route density (TMARD) from the current level.
3) No decrease in core (secure) area from the current level.

A guideline is to utilize the best available technology to analyze human access and its effects on the grizzly bear in the Recovery Zone for motorized access.

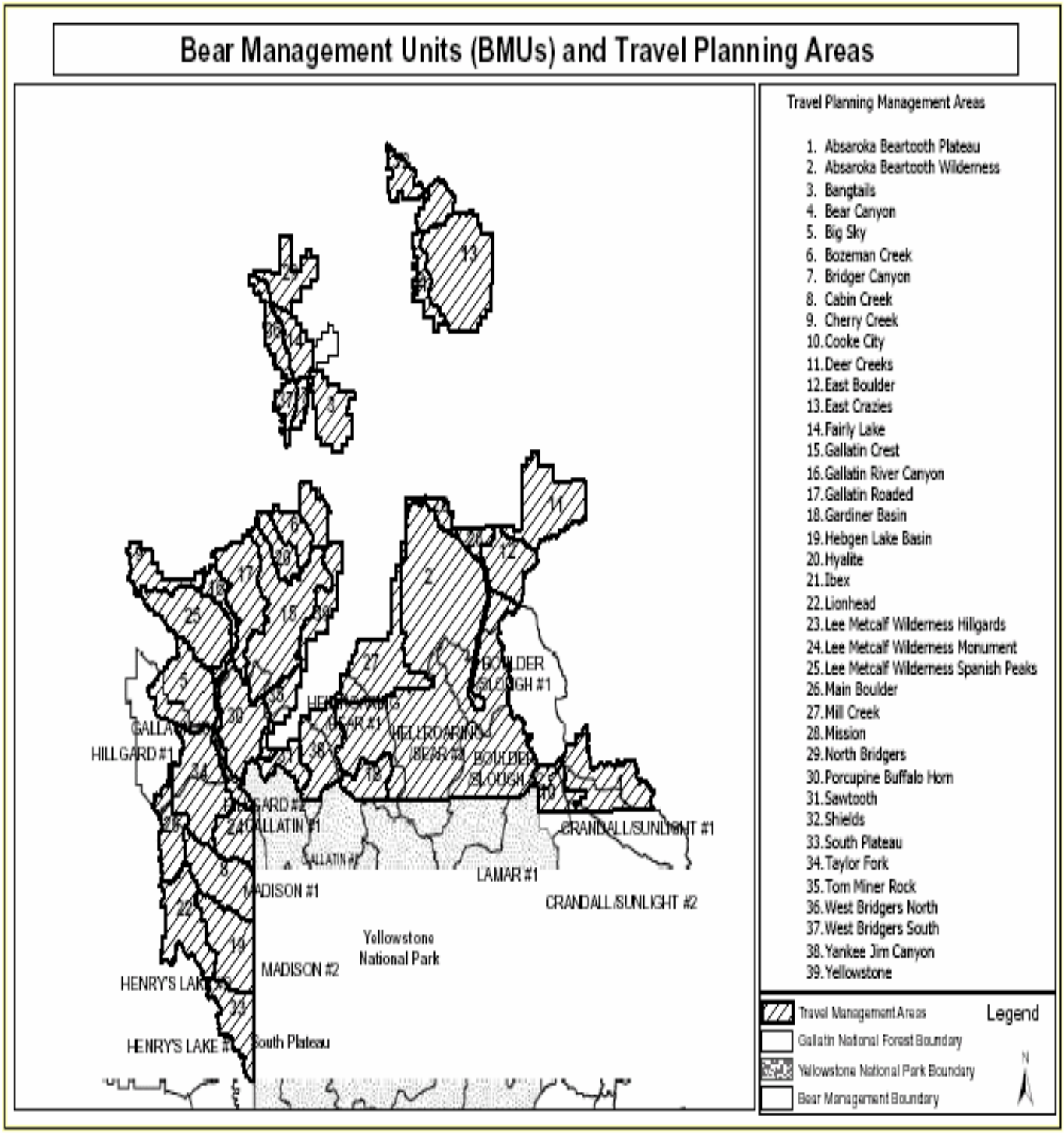
The Conservation Strategy for Grizzly Bear in the Yellowstone Ecosystem (ICST 2003) was developed by the Interagency Conservation Strategy Team and completed in March 2003. The three Regional Foresters managing Forests in the Greater Yellowstone Area, the three Directors of State Fish and Game agencies and Bureau of Land Management signed a Memorandum of Understanding (ICST 2003:12-13) to seek implementation of the Grizzly Bear Conservation

Strategy. The Conservation Strategy is currently undergoing a NEPA process that will amend it to the Forest Plans of Forests in the Yellowstone area and will replace most, if not all, of their current Forest Plan direction for grizzly bears.

The direction in the Conservation Strategy (ICST 2003) makes motorized access direction more clear, and bases it on the most recent science. The Conservation Strategy (2003) direction was used in this issue to assess the effects of travel management on grizzly bears. Amendment #19 and Biological Opinion of the USFWS (1955) stated that the Gallatin National Forest was to adopt Yellowstone access standards when they became available. The Conservation Strategy makes these standards available. The Forest Service will be undergoing consultation with the US Fish and wildlife Service during this travel management planning process that will cover all Threatened and Endangered species in relation to travel management. In addition, if the access standards for the grizzly bear change during the Conservation Strategy amendment process for Greater Yellowstone Area Forests, those standards would then be incorporated into the Gallatin Forest Plan.

The standard for access management in the Conservation Strategy is to *"maintain secure habitat in bear management subunits at or above 1998 levels"* (ICST 2003:39). Secure habitat is defined as any area more than 500 m from an open or gated motorized access route (Table 3.10. 1). The year 1998 was chosen as the baseline because this was the access level at which the grizzly bear population recovered. Some changes are allowed under specific conditions. This direction applies only to the Recovery Zone (Primary Conservation Area). The rule set for projects is found in the Conservation Strategy (ICST 2003:41) (Table 3.10. 1). There are three subunits designated as needing improvement: Henrys Lake #2, Gallatin #3 and Madison #2. These lie at least partially on the Gallatin National Forest (Map 3.1).

Map 3.1 Grizzly Bear Management Units and Subunits and Travel Planning Areas on the Gallatin National Forest.



It should be noted that the Conservation Strategy (2003) also has a standard for a 1998 baseline for the number of developed sites within the Recovery Zone (PCA). If new developed sites are proposed, they must be mitigated for within the subunit. For travel management planning, this direction relates most directly to fact that trails are linked to trailheads that may often be developed sites. This document does not address trailhead development, but it should be kept in mind that there are some constraints in the PCA. This direction also relates to the development of backcountry airstrips which are proposed under Alternative 3. For the Recovery Zone, these would be new developed sites, and they could be associated with an increase in motorized route density and a reduction in secure habitat. If any backcountry airstrips are going to be developed in the Recovery Zone, they would have to be mitigated for within the same subunit. There are three proposed backcountry airstrips proposed in the PCA under Alternative 3. They are Horse Butte (Madison #2 subunit), South Plateau (Plateau #1 subunit), and Ferrell Lake (Gallatin #3 subunit).

Additional information from the Draft EIS for Forest Plan Amendments for Grizzly Bear Conservation for the Greater Yellowstone Area National Forests (p. 36, USDA FS, 2004) indicates that habitat monitoring items include secure habitat, OMARD greater than one mile/square mile, and TMARD greater than 2 miles/square mile. These route densities are of the greatest concern to the US Fish and Wildlife Service because they are the densities at which bears seem to experience more difficulty moving through the landscape.

Table 3.10. 1 The rule set for secure habitat management in the Yellowstone Recovery Zone (ICST 2003:41).

Criteria	Definition
Software, Database and Calculation Parameters	ARC INFO using the moving window GIS technique (Mace et al. 1996), 30 m pixel size, square mile window size and density measured as mi/sq mi. Motorized access features from the Cumulative Effects Model (CEM)* GIS database
Motorized Access Routes in Database	All routes having motorized use or the potential for motorized use (restricted roads) including motorized trails, highways, and forest roads. Private roads and state and county highways counted.
Season Definitions	Season 1 – 1 March to 15 July. Season 2 – 16 July to 30 November. There are no access standards in the winter season (1 December to 28 February).
Habitat Considerations	Habitat quality not part of the standards but 1) Replacement secure habitat requires equal or greater habitat value 2) Road closures should consider seasonal habitat needs.
Project	An activity requiring construction of new roads, reconstructing or opening a restricted road or recurring helicopter flights at low elevations.
Secure Habitat	More than 500 m from an open or gated motorized access route or reoccurring helicopter flight line. Must be greater than or equal to 10 acres in size. Replacement secure habitat created to mitigate for loss of existing secure habitat must be of equal or greater habitat value and remain in place for a minimum of 10 years. Large lakes not included in calculations.
Activities Allowed in Secure Habitat	Activities that do not require road construction, reconstruction, opening a restricted road, or reoccurring helicopter flights. Over-snow use allowed until further research identifies a concern.
Inclusions in Secure Habitat	Roads restricted with permanent barriers (not gates), decommissioned or obliterated roads, and/or non-motorized trails.
Temporary Reduction in Secure Habitat	One project per subunit is permitted that may temporarily reduce secure habitat. Total acreage of active projects in the Bear Management Unit (BMU) will not exceed 1% of the acreage in the largest subunit within the BMU. The acreage that counts against the 1% is the 500-m buffer around open motorized access routes extending into secure habitat. Secure habitat is restored within one year after completion of the project.

Criteria	Definition
Permanent Changes to Secure Habitat	A project may permanently change secure habitat provided that replacement secure habitat of equivalent habitat quality (as measured by CEM or equivalent technology) is provided in the same grizzly subunit. The replacement habitat either must be in place before project initiation or be provided as an integral part of the project plan.
Subunits with Planned Temporary Secure Habitat Reduction	Secure habitat for subunits Gallatin #3 and Hilgard #1 will temporarily decline below 1998 values due to the Gallatin Range Consolidation Act. Upon completion of the land exchange and associated timber sales, secure habitat in these subunits will be improved from the 1998 baseline.
Subunits with Potential for Improvement	Access values for Henrys Lake #2, Gallatin #3, and Madison # 2 have the potential for improvement. The quantity and timing of the improvement will be determined by the Gallatin National Forest Travel Management Plan.
Proactive Improvement in Secure Habitat	A proactive increase in secure habitat may be used at a future date to mitigate for impacts of proposed projects of that administrative unit within that subunit.
Exceptions for Caribou-Targhee National Forest	When fully adopted and implemented the Standards and Guidelines in the 1997 revised Targhee Forest Plan met the intent of maintaining secure habitat levels.

*CEM DEFINITION- Cumulative Effects Model - a model for assessing effects of habitat and human activities on grizzly bears. The model includes a habitat routine and a disturbance routine. Habitat value is the innate value of the habitat for bears based on vegetation, cover, edge and protein sources. Habitat effectiveness is how effective the habitat is for bears after the inclusion of human activities.

Table 3.10. 2a shows the relative size of the subunits, secure habitat, and how much of each subunit is in a situation where it is somewhat protected from the likelihood of additional motorized routes. It can be seen that some subunits have a lot of secure habitat and are likely to stay that way. Most of the largest subunits are have quite a bit of Wilderness and National Park land within them. There are some subunits that have a low percentage of these protected areas and currently have a relatively low percentage of secure habitat. These include Henrys Lake #2, Gallatin #3 and Madison #2 which are also the subunits "in need of improvement" because of a lower percentage of secure habitat existing within the subunit. Other subunits that might be considered at some risk due to the lack of protected areas are Plateau #1, Hilgard #1 and #2, Crandall/Sunlight #1 and #2, and Hellroaring/Bear #1, however, these subunits currently have more than 69 or 70% secure habitat.

Table 3.10. 2a Square miles of secure habitat in the subunits all or part on the Gallatin National Forest (numbers include private inholdings within Forest Service boundaries and all ownerships of roads, FS, NPS, BLM, state, county, private) as given in Conservation Strategy (p. 151). Subunits "in need of improvement" are highlighted.

Subunit	Subunit Area (sq mi)	Total Secure Habitat (sq mi)	Percent Secure Habitat	Wilderness or Park Secure Habitat (sq mi)	Percent Secure as Wilderness or Park
Boulder Slough #1	282	272	96%	269	95%
Boulder Slough #2	232	227	98%	227	98%
Lamar #1	300	268	89%	256	85%
0Crandall Sunlight #1	130	105	81%	57	44%
Crandall Sunlight # 2	316	260	83%	97	31%
Hellroaring/Bear #1	185	142	77%	101	55%
Hellroaring/Bear #2	229	228	100%	228	100%
Gallatin #3	**218**	**120**	**55%**	**8**	**4%**
Hilgard #1	201	140	70%	107	53%
Hilgard #2	141	100	71%	63	45%
Madison #1	227	163	72%	108	48%
Madison #2	**149**	**99**	**66%**	**94**	**63%**

Subunit	Subunit Area (sq mi)	Total Secure Habitat (sq mi)	Percent Secure Habitat	Wilderness or Park Secure Habitat (sq mi)	Percent Secure as Wilderness or Park
Henrys Lake #2	**140**	**64**	**46%**	**0**	**0%**
Plateau #1	286	197	69%	124	43%

Table 3.10.2.b shows the effects of non National Forest routes on the subunits lying all or in part on the Gallatin National Forest. This shows that the 3 subunits 'in need of improvement' are all fairly heavily impacted by non-Forest Service routes. For instance, if the Gallatin National Forest closed all of its routes in Henry's Lake #2, there would still be 15% of the subunit that would not be secure habitat.

Table 3.10.2.b. Effects of non-National Forest routes (private, state, and county) on Gallatin National Forest grizzly bear subunits.

Subunit	OMARD % > 1 mi/sq mi	TMARD % > 2 mi/sq mi	Percent Secure Habitat
Boulder Slough #1	2	0	97
Boulder Slough #2	0	0	100
Lamar #1	2	1	97
Crandall Sunlight #1	6	1	92
Crandall Sunlight # 2	8	1	89
Hellroaring/Bear #1	9	4	91
Hellroaring/Bear #2	0	0	100
Gallatin #3	**16**	**8**	**81**
Hilgard #1	6	2	91
Hilgard #2	2	3	93
Madison #1	6	3	94
Madison #2	**8**	**4**	**90**
Henrys Lake #2	**14**	**7**	**85**
Plateau #1	2	1	95

Habitat Value and Habitat Effectiveness

Habitat value is the quality of the habitat for grizzly bears without taking any human activities into account. From the following table (Table 3.10. 3), it can be seen that more than half of the habitat value in some subunits rates High Moderate value or above. Habitat value is a seasonal habitat value based on habitat characteristics of plant food, cover, edge and protein source (usually big game winter range). These include: Boulder Slough #1 and #2, Lamar #1, Hellroaring/Bear #1 and #2, Gallatin #3 and Hilgard #1 and #2. Of these subunits, Boulder Slough #2, Lamar #1, Hellroaring/Bear #1, Gallatin #3 and Hilgard #1 and #2 have secure habitat that is more than 50% High Moderate or above.

Table 3.10. 3 Percent of six habitat value categories in each of the grizzly bear management subunits on the Gallatin National Forest. Six categories were determined from raw CEM habitat value outputs that provide relative comparisons across seasons. They are: VL = Very Low, L = Low, LM = Low Moderate, HM = High Moderate, H= High, VH = Very High

	Habitat Value Category Percent of Subunit							Habitat Value Category Percent of Secure Habitat						
Subunit	VL	L	LM	HM	H	VH	Subunit Area (sq mi)	VL	L	LM	HM	H	VH	Total Secure Habitat (sq mi)
Boulder Slough #1	12	1	40	45	32	0	282	13	1	42	43	2	0	272
Boulder Slough #2	9	6	33	52	1	0	232	9	6	34	50	1	0	227
Lamar #1	4	2	26	68	1	0	300	4	1	25	70	0	0	268
Crandall Sunlight #1	10	34	43	11	2	0	130	11	35	42	10	2	0	105
Hellroaring/Bear #1	17	20	12	51	0	0	185	17	15	11	57	0	0	142
Hellroaring/Bear #2	21	5	26	47	2	0	229	21	5	26	46	2	0	228
Gallatin #3	18	17	13	51	1	0	218	21	12	12	55	1	0	120
Hilgard #1	19	12	18	51	1	0	201	20	10	19	51	0	0	140
Hilgard #2	13	8	17	61	1	0	141	15	8	13	64	1	0	100
Madison #1	4	12	52	21	10	2	227	5	12	58	17	8	1	163
Madison #2	2	6	69	19	3	2	149	0	4	79	14	2	1	99
Henrys Lake #2	7	19	26	46	2	1	140	9	17	24	50	0	1	64
Plateau #1	2	29	58	11	0	0	286	1	28	58	13	0	0	197

Table 3.10. 4 shows the habitat effectiveness of each subunit throughout the bear year. Habitat effectiveness is a number derived from a combination of habitat qualities and types of human activity or disturbance in the area. It can be seen from this table that some subunits, like Boulder/Slough #1 have habitat effectiveness that is high relative to the other subunits throughout the year. Others, like Plateau #1 and Gallatin #3, do not have especially high habitat effectiveness values at any time of year. Many of the subunits only have good values in one or two of the four seasonal periods. By looking at the value by season, one can decide if seasonal route closures may be of benefit to the grizzly bear in certain subunits.

Table 3.10. 4 Habitat effectiveness by season for subunits on the Gallatin National Forest from the Grizzly Bear Cumulative Effects Model. Subunits "in need of improvement" of secure habitat are highlighted.

Subunit	Spring 3/1 - 5/15	Estrus 5/16 - 7/15	Early Hyperphagia 7/16 - 8/31	Late Hyperphagia 9/1 - 11/30
Boulder Slough #1	105	105	119	853
Boulder Slough #2	123	112	111	521
Lamar #1	127	118	136	571
Crandall Sunlight #1	53	94	78	800
Hellroaring/Bear #1	85	74	95	628
Hellroaring/Bear #2	117	99	98	628
Gallatin #3	**78**	**69**	**89**	**599**
Hilgard #1	99	68	91	614
Hilgard #2	81	97	132	902
Madison #1	53	115	227	329
Madison #2	**41**	**60**	**147**	**63**

Henrys Lake #2	**41**	**41**	**33**	**614**
Plateau #1	26	49	36	109

Overview of the Effects of Motorized and Non-Motorized Use on Bears

Tyers (2006) summarized recent literature on the effects of various types of uses on bears, focusing on grizzly bears. This information is presented in this Overview Section.

Various efforts have been made to aggregate and interpret abundant data related to the effects of human activities on grizzly bears. For example, the Interagency Grizzly Bear Committee, a consortium of state and federal managers, published the Grizzly Bear Compendium (1987), a review all available information on grizzly bear biology and management in North America through 1987.

In addition, Joslin and Youmans (1999) coordinated preparation of Effects of Recreation on Rocky Mountain Wildlife for the Wildlife Society, Montana Chapter. It provides a Montana perspective on the ecology of a variety of wildlife species, including the grizzly bear, as well as insights into the development of regional wildlife management policies (Claar 1999 *in* Joslin and Youman). In contrast to the Compendium, Joslin and Youman's review of grizzly bear management literature is less expansive but more contemporary. Specific to grizzlies, it briefly summarizes current knowledge on the effects to bears of motorized and non-motorized recreation, hunting, and structural developments.

These and other documents reveal that our understanding of the effects of human activities on grizzly bears has evolved, progressing with the addition of each new research finding. The grizzly bear was listed in 1975 under the Endangered Species Act. This initiated a sequence of increasingly sophisticated management strategies directed towards population recovery and enhanced by corresponding research. Associated studies were a successive response to the concerns expressed by agency personnel as the complexities of grizzly bear management emerged following listing.

When the grizzly bear was initially listed, mortality prevention was the primary focus for species conservation. However, succeeding recovery strategy iterations recognized habitat use, quality, and availability as important elements of grizzly bear management (Claar 1999 *in* Joslin and Youman). The effect of human activities on bear displacement and mortality risk levels was prominent in grizzly bear conservation discussions while National Forest Plans were developed in the 1970s and 1980s.

Since the creation of the respective Forest Plans, substantial increases have occurred in the human population within and adjacent to the grizzly bear recovery area, along with a concomitant demand for recreation opportunities on public lands. These patterns necessitated commensurate grizzly bear management guidelines (Claar 1999 *in* Joslin and Youman). In response, in 1986, the Interagency Grizzly Bear Committee outlined procedures for grizzly bear habitat maintenance and improvement, minimizing grizzly-human conflict potential, and resolving grizzly-human conflicts (Claar 1999 *in* Joslin and Youman).

Off-road vehicle (ORV) capabilities have become an additional factor to contend with in managing grizzly bear habitat. From the 1950s through the 1970s, land management agencies established

road systems on public lands outside of wilderness to provide access to timber and mineral resources and to accommodate public use. However, in the interim, there have been major technological improvements to summer and winter ORVs. These machines have become easier to use and more reliable and affordable. Consequently, ORV use on public lands has increased along with concerns for the effects of this use on grizzly bears (Claar 1999 *in* Joslin and Youman).

As stated earlier, research techniques addressing the effects of human activities on grizzly bears evolved parallel to the development of management strategies and practices. For example, a number of early studies (IGBC 1987, Claar 1999 *in* Joslin and Youman) dealt with the effects of roads on grizzly bears and, to various degrees, universally showed negative impacts (Archibald et al. 1987, Mattson et al. 1987, McLellan and Shakelton 1988, Kasworm and Manley 1990). Geographic information systems technology allowed more recent studies to calculate precise estimates of road density and the response of grizzlies to these densities. The next generation of studies used multivariate analysis to examine the relationships among roads, habitat, and grizzly bear use at hierarchical levels. Most simply stated, these efforts indicated that the effects to bears are increasingly negative as road densities and traffic volumes increase (Claar 1999 *in* Joslin and Youman).

Compared to assessments of grizzly bear response to roads, few studies reported the effects of motorized recreation on bears during the winter. Efforts to assess den abandonment resulting from over snow traffic are common to these studies, although data are limited. In addition, various authors express concern that physiological stresses could result in serious consequences to bears, with perhaps the greatest potential for disturbance from snowmobile activity occurring when females with cubs are still confined to the den vicinity during spring and when bears descend to more gentle terrain accessible to snowmobiles. However, again, data are limited. Almost no data are available on the effects of winter non-motorized human use on grizzlies (Claar 1999 *in* Joslin and Youman).

Human activities apart from roadways and settlements have been another management consideration and research focus. Encounters between grizzly bears and people often occur in the backcountry on public lands. Similar to the road density studies, data on the impacts of human foot traffic on bears also indicate a negative relationship, although fewer studies quantify these effects. A common conclusion among these efforts is that the rate of fear-induced charges and consequent injuries is less where human activities are predictable and when trails are separated from preferred habitat (Claar 1999 *in* Joslin and Youman).

The following sections break the effects out by season and type of use.

Summer Motorized Use

Various efforts have been made to aggregate and interpret a plethora of data related to the effects of human activities on grizzly bears. For example, the Interagency Grizzly Bear Committee, a consortium of state and federal managers, directed preparation of the Grizzly Bear Compendium (IGBC 1987:145-148) to facilitate review of all available information on grizzly bear biology and management in North America through 1987.

In addition, Joslin and Youmans (1999) coordinated preparation of the Effects of Recreation on Rocky Mountain Wildlife for the Montana Chapter of the Wildlife Society. It provides a Montana perspective on the ecology of a variety of wildlife species, including the grizzly bear, as well as insights into the evolution of regional wildlife management policies. Compared the Compendium, Joslin and Youman's review of grizzly bear management literature is less exhaustive but more contemporary. Specific to grizzlies, it briefly summarizes current knowledge on the effects to bears of motorized and non-motorized recreation, hunting, and structural developments.

These and other documents reveal that, when the grizzly bear was listed in 1975 under the Endangered Species Act, the primarily focus for species conservation was mortality prevention. However, later species recovery strategies have recognized habitat use, quality, and availability as important elements of grizzly bear management (USDI 1982, 1993).

The effects of human activities on bear displacement and mortality risk levels assumed prominence in grizzly bear conservation discussions as National Forest plans were developed in the 1970s and 1980s. In 1986, the Interagency Grizzly Bear Committee provided guidelines for agencies to maintain and improve habitat, minimize grizzly-human conflict potential, and resolve grizzly human conflicts. Since the creation of these documents, substantial increases have occurred in human population within and adjacent to the Grizzly Bear Recovery Zone along with a concomitant demand for recreation opportunities on public lands, a pattern that necessitates grizzly bear management guidelines commensurate with this phenomenon (Joslin and Youmans 1999).

Off-road vehicle capabilities have become an additional factor to contend with in managing grizzly bear habitat. From the 1950s through the 1970s, land management agencies established road systems on public lands outside of Wilderness to provide access to timber and mineral resources and provide public access. However, in the interim, there have been major technological improvements to off-road vehicles (all-terrain, trail bikes, and snowmobiles). These machines have become easier to use, more reliable, and more affordable. Consequently, their use on public lands has increased along with concerns for the effects of this use on grizzly bears (Joslin and Youmans 1999).

Studies addressing the effects of human activities on grizzly bears have gone through several evolutions. A number of early studies (IGBC 1987, Joslin and Youmans 1999) addressed the effects of roads on grizzly bears and, to various degrees, universally showed negative impacts (Archibald et al. 1987, Mattson et al. 1987, McLellan and Shakleton 1988, Kasworm and Manley 1990).

There have been a number of studies on the effects of various types of routes (motorized roads and trails and non-motorized trails) on different types of wildlife species. Most studies have focused on big game species and grizzly bears. Results vary, but the most common theme seems to be that motorized routes generally displace elk and bears, and they use the habitat adjacent to motorized routes less than areas farther from these routes. Results vary somewhat with habitat quality, cover availability, traffic volume, season and some other variables. There are less studies on the effects non-motorized routes on wildlife species. There are also few studies comparing motorized roads to motorized trails.

Geographic information systems technology has allowed more recent studies to calculate precise estimates of road density and the response of grizzlies to these densities. For example, Mattson (1993) employed this technology in the Yellowstone area and recommended maximum road densities for grizzly bear habitat maintenance of 0.6 mi/sq mi with 0.26 mi/sq mi for home ranges of wary female bears. Similarly, in preliminary reports, Mace et al. (1996) concluded that bear use in the South Fork of the Flathead was significantly less than expected where open road density was >1mi/sq mi or total road density was >2mi/sq mi.

Mace et al. (1996) furthered their studies in the Flathead area by assessing bear habitat use at a landscape level, within the defined area of composite home ranges, and in relationship to roads with differing traffic volume. Most simply stated, this and other studies indicate that the effects to bears are increasingly negative as road densities and traffic volumes increase.

At the broadest scale, female grizzlies selected against private lands with high human and road densities (Mace et al. 1996). The relative probability of occurrence of bear activity was zero for these areas even though they contained high quality seasonal ranges including ungulate wintering areas and riparian habitat. Similarly, selection was greatest for unroaded cover types on multiple use public lands and declined as road densities increased. For example, the relative probability of occurrence of grizzlies on the National Forest Service was negatively associated with increasing values of road density and declined to zero as densities approached 6.0 km/km2 (Mace et al. 1996). Within a 0.5 km buffer around roads, the next level of habitat selection, bear responses differed by season and traffic volume. Few home ranges contained roads with traffic volumes of >60 vehicles/day, and most bears avoided roads having >10 vehicles/day. During all seasons, most individual bears exhibited neutral or positive selection for buffers surrounding closed roads and roads receiving <10 vehicles per day, implying that important habitat features such as avalanche chutes and cutting units occurred near these roads.

Analysis of bear habitat use at three spatial scales in relationship to roads demonstrated a common pattern (Mace et al. 1996). Avoidance of roads increased as road densities and traffic volumes increased. At all landscape levels, bear density declined as road density and traffic volume increased. Under certain habitat conditions and seasons, the positive attraction to specific cover types was stronger than the negative impacts of roads. Thus, in highly preferred seasonal habitats that tended to be open-canopied, grizzly bears would tolerate low levels of disturbance and would not abandon the habitat. In these circumstances, bears tolerated low levels of disturbance but their vulnerability to humans increased.

There was a relationship found between mortality of instrumented grizzlies and human activities (Mace et al 1996). From 1988 through 94, humans killed eight marked grizzly bears in the study area. These deaths were directly influenced by road access through illegal killing and through management removal of bears conditioned to human foods in developed areas.

Mace et al. (1996) summarized by stating that grizzly bears can utilize roaded habitats, but spatial avoidance will increase and survival will decrease as traffic levels, road densities, and human settlement increases. They believe that the long-term survival of grizzly bears in the Swan Mountains in northwest Montana will depend on their ability to utilize and survive in lower elevation, mixed ownership habitats. Moreover, efforts to mitigate road effects through access

restrictions on multiple-use lands would have limited value if habituation and mortality levels are not minimized on or adjacent to private land.

In response to their findings, Mace et al. (1996) recommended several management strategies. They advocated that road density standards and road closure programs incorporate seasonal habitat requirements of grizzly bears. Specifically, management should minimize road density and traffic volume in watersheds having highly preferred habitats. Consequently, based on local knowledge of grizzly bear habitat selection patterns, road density standards could then be relaxed to some degree in less suitable habitats, allowing increased public access while minimizing threats to the local grizzly bear population. Road access programs could include short-term access during periods when displacement impacts to grizzly bear are minimal.

McClelland and Shackleton (1988) found that most grizzly bears used habitats within 100 m of roads to a lesser degree than expected, which equated to an 8.7% habitat loss. The loss of this habitat was disproportionate to (greater than) its size because areas juxtaposed to roads contained high quality bear foods in spring and fall. They also concluded that bear avoidance of roads was independent of traffic volume, suggesting that even a few vehicles can cause displacement. This conclusion is contrary to the findings of some other studies. Reduced use by grizzly bears of habitat within 100 m of roads did not differ among primary, secondary and tertiary roads.

Bear behavior reduced the effects of road-related habitat loss. Roads and nearby areas were used at night but avoided during the day (McClelland and Shackleton 1988). Darkness probably provided security cover, but traffic levels were also likely lower during those hours.

Limited data indicated minimal demographic effects during their study, but the authors also pointed out that roads increased access for legal and illegal hunters, the major source of adult grizzly mortality (McClelland and Shackleton 1988). When roads are developed for resource industries in grizzly bear habitat, the bear population becomes vulnerable unless vehicle access and people with firearms are controlled.

Mattson and Knight (1991) concluded that Yellowstone Park's backcountry remains the safest for bears, and areas impacted by secondary roads and major developments, remain the most lethal. Given questions about the grizzly bear population's viability, they discouraged an increase in the area impacted by secondary roads and major developments.

Archibald et al. (1987) investigated the responses of grizzly bears to logging truck traffic in the Kimsquit River Valley, British Columbia. Sound level readings were recorded along 18 transects perpendicular to the roads in areas with and without cover. Specifically, these readings were recorded at 25 m intervals from 0-200 m along the transects. Noise level contours were drawn around the road at the 80, 70 and 60 dBC (decibels) levels to establish the zone of hauling activity. Noise levels below 60 dBC were not considered relevant because they were often masked by ambient noise. Grizzly bear location information was gathered on two resident radio-collared adult females whose home ranges were bisected by the road. Data were available for four years: two pre-logging years (1982 and 1983) and two logging years (1984 and 1985).

The average number of daily loads hauled over the 1984 season was 14, and the maximum was 27 (Archibald et al. 1987). On average, logging trucks moved along the main haul road at 30-minute

intervals and 15-minute intervals during peak activity. In 1985, hauling distances were greater and the average daily number of loads declined to 10. The maximum daily haul was 15. In 1985, logging trucks traveled the main haul road at 35-minute intervals on average and 25-minute intervals during peak activity. There was a 78% reduction in the percentage of relocations in the zone of hauling activity between the pre-logging and logging periods. Moreover, the bears avoided the zone of hauling activity independent of the presence of visual screens. There was a 33% decline in the number of times Bear #25 crossed the road and a 39% decline in the number of times Bear #8 crossed the road between periods.

Mattson, Knight and Blanchard (1992) found that grizzly bear occupancy of habitat near human facilities was reduced, efficient foraging strategies were disrupted, and subordinate or security–conscious cohorts were displaced into habitat nearer developments by the more dominant ones, particularly during summer and fall. Adult females and subadult males residing closer to developments were management-trapped at a higher rate than animals of the same class residing farther away. Adult females and subadults bore a disproportionate part of costs associated with avoiding roads and developments. For these reasons, and because adult females are generally thought to operate under considerable energetic costs in the Yellowstone area, tolerance of developments and roads may have resulted in higher mortality and lower productivity among the adult female cohort.

Wieglus et al. (2002) investigated grizzly bear selection of three road types in the Selkirk Mountains of northern Idaho, northeastern Washington, and southern British Columbia from 1986-1991. They analyzed use of roads by 11 bears (5 female and 6 male) in an area containing open (motorized public use allowed) and closed roads (no motorized public use allowed) and 11 bears (7 female and 4 male) in an adjacent area containing restricted roads (forestry use only).

As predicted, most females and males selected against open roads (Wieglus et al. 2002). However, most females selected against closed roads, and no bears selected against restricted roads. The fact that female grizzly bears selected against closed roads was contrary to expectations. As an explanation, the authors suggested that females might first choose their home range area based on a paucity of open roads and then select against closed roads within the resulting home range. They did not believe that females avoided closed roads to prevent encounters with males utilizing the best habitat because they did not observe sexual segregation and avoidance of males by females as a general behavioral pattern. Instead, they interpreted the selection against closed roads by females as cautious behavior. Because open roads are in relatively close proximity to closed roads and within bear home ranges, female bears may have failed to discriminate between open and closed roads.

Chruszcz et al. (2003) found that grizzly bears used areas close to roads more than expected, particularly roads with low traffic volume. Habituated bears were closer to roads than wary bears. Males were closer to low-volume roads than females, but crossed roads less than females during the berry season. Bears were more likely to cross low-volume roads than high-volume roads and were more likely to cross at points with higher habitat rankings. In addition, bears were more likely to cross high volume roads when moving from areas with low habitat values to areas with high habitat values.

Efforts to prevent loss of habitat connectivity across highways should involve maintenance of high-quality grizzly bear habitat adjacent to roads and should address the effects of traffic volume on the road-crossing decisions of grizzly bears (Chruszcz et al. 2003). Two patterns emerge from their study: the avoidance of high-volume roads in a major transportation corridor, and the importance of high quality habitat in determining grizzly bear movements in relation to highway traffic volumes. The reduced cross-valley permeability caused by the presence of the Trans Canada Highway (TCH) may result in harmful population effects in view of the great mobility and extensive spatial requirements of grizzly bears. They advocated continuous highway fencing and effective wildlife passages.

Yost and Wright (2000) investigated moose, caribou and grizzly bear distribution in relation to road traffic in Denali National Park, Alaska, 1996-1997. Caribou and grizzly bear distributions indicated no pattern of traffic avoidance. Road traffic appeared to influence grizzly bear distribution less than forage availability, abundance and phenology. While some bears might have been intolerant of road activity and avoided its vicinity, many were clearly habituated and carried out daily activities in close proximity to traffic and human onlookers.

Kasworm and Manley (1989) found that grizzly bears used habitat 0-914 m from open roads less than expected based on availability during spring and fall. Black bears used habitat 0-274 m from open roads less than expected during spring and used habitat 0-914 m from roads less than expected during fall. Grizzly bears used habitat 0-122 m from trails less than expected during spring and fall. Black bears used habitat 0-122 m from trails less than expected during spring and used habitat 0-305 m from trails less than expected during fall. Habitat availability appeared related to grizzly bear avoidance of trails, and black bear avoidance of roads and trails. Mean distance from grizzly bear radio-locations to a seasonally closed road increased when the road was opened, though black bear locations did not.

Trails (including closed roads) displaced both species of bears less than open roads. Twenty-eight percent of all grizzly bear locations occurred in the three closest Distance to Road Categories (DRCs) (60% of the area) (Kasworm and Manley 1989). Grizzly bear avoidance of high quality habitat near roads and trails may lessen the opportunity for individuals to obtain food and increase intraspecific competition by further forcing bears into limited remote habitat. Conversely, 58% of black bear locations occurred in the three closest DRCs. Black bear tolerance of disturbance may provide an opportunity for this species to exploit habitat in DRCs 1-3 in the relative absence of grizzly bears.

Schallenberger (1977) reviewed the literature related to the effects of oil and gas exploration on grizzly bears at a time when few studies were available to establish predevelopment guidelines. He concluded that these activities are generally detrimental to bears and summarized the greatest impacts involved the construction of roads into unroaded areas and increased numbers of people.

Gibeau et al. (2001) used 4,359 daily telemetry locations from 49 grizzly bears from 1994-1998. Of the four types of human developments they investigated, the Trans Canada Highway (TCH was avoided most by grizzly bears. Female bears avoided the freeway regardless of the habitat quality or time of day. Males, and especially subadult males, were found closer to the TCH when within or adjacent to high quality habitat and during the human inactive period. Part of the influence is the

high density of humans in the valley where the TCH is found. Greater use of hiding cover by males may be part of the strategy used to take advantage of high quality habitat near roads. Although grizzly bears become accustomed to predictable occurrences including traffic, these results suggest otherwise. For high-speed high-volume highways, there is a point where the combination of traffic volume and highway configuration overrides a bear's attraction to high quality habitat. Bears were generally reluctant to cross it, and they concluded that it is a barrier to adult female grizzly bear movement. The same pattern of grizzly bear response to paved roads was seen as with the TCH, although both sexes were found closer than a random pattern would predict. Females remained further than males from approved roads regardless of the habitat quality or time of day. Males were found closer to paved roads when within or adjacent to high quality habitat and during the human inactive period. Unlike paved roads that were located in valley bottoms and good quality habitat, high use trails were widely distributed throughout all types of habitats.

While distance measurements were not as great as for the TCH, bear response to high use features (highways) were still twice as high those of paved roads or high use trails females, and especially subadult females were found closer to features when within or adjacent to high quality habitat during the human inactive period (Gibeau et al. 2001). Males, on the other hand, remained further away from features regardless of habitat quality or time of day.

Graves (2002) is the only study known at this time to look at how grizzly bears use the habitat in relation to motorized trails. Although the sample size was small, she found that grizzly bears used areas near trails less than expected. This result was true for both ATV trails and single-track motorcycle trails. Bears selected against areas within 250-900 m of ATV trails and within 450-600 m from single-track trails. Levels of human use, habitat quality, bear experience and habituation may have had something to do with whether or not a bear used an area near a trail less than expected.

Summer Non-Motorized Use

The following information pertains more to non-motorized trails and their effects on bears. McClellan and Shackleton (1989) summarized their study by stating that bears responded more strongly to ground-based human activities, such as people on foot or moving vehicles, when in the open than when in cover. Cover was less important in determining bear behavioral responses to fixed wing aircraft than the other stimuli. With the exception of people on foot, bears generally displayed stronger reactions to human activities that occurred <75 m away than at greater distances. The strongest response of bears was to people on foot, and these reactions were most extreme in areas of low human use.

Jope (1985) found that although bears were seen as often on heavily used trails as on trails with little human use, full charges towards people by bears occurred primarily on trails with little human use. The findings of this research together with records on human injuries in Yellowstone Park suggest that habituation of grizzly bears to hikers reduces the rate of fear-induced charges and consequent injuries.

Gunther (1989) documented 36 encounters between bears and backcountry users. Subadults and females with cubs-of-the-year were involved in 67% of the encounters, but represented 31% of the bear sightings. Grizzlies reacted to encounters by fleeing (53%), showing no reaction (31%), or

charging (14%). In 18 of 19 incidents where bears fled, they ran to forest cover before stopping. Bears made significantly more frequent use of areas>500 m from tree cover during the closed and restricted periods than during the open periods. Foot parties were more likely to be charged during an encounter with a grizzly than were people on horseback.

Mace and Waller (1996) found that grizzly bears in the Jewel Basin Hiking Area did not position themselves in a random fashion relative to trails and lakes with campsites. During each season, bears were significantly farther away from areas frequented by humans than from other areas. Grizzly bear distances from both lakes and campsites and trails generally increased as the seasons progressed. Their data suggest that grizzly bears positioned themselves further from lakes with campsites than from trails. In multivariate models, however, distance to trails and lakes were significant variables only during summer and autumn. During these two seasons, the relative probability of grizzly bear use increased as distances to trails and lakes with campsites increased. During all seasons, grizzly bears in this area selected for open habitat types relative to the forest habitat type. Most of the trail system (66%) occurred in the forest habitat type, which may partially explain the lack of confrontations between hikers and grizzly bears.

Bears were found closer to trails during the night when within high quality habitat and further from trails when distant from high quality habitat (Gibeau et al. 2001). Their observed avoidance of high use trails far from high quality habitat may be a reflection of a greater opportunity for bears to select high quality habitat in the relative absence of humans. Grizzlies may not have the opportunity to truly avoid paved roads without forfeiting access to much of the high quality habitats.

It is clear that bears tend to react negatively to humans on foot. What is less clear is a quantitative relationship of how far bears are displaced from foot trails. Bears apparently also habituate to humans on trails, but cover and habitat quality also have an effect on whether or not bears will be in areas that humans frequent on foot.

Winter Motorized Use

In 2002, the all Greater Yellowstone Area National Forests (Gallatin, Custer, Beaverhead-Deerlodge, Shoshone, Bridger-Teton), with the exception of the Caribou-Targhee, consulted with the US Fish and Wildlife Service on the effects of snowmobile use on grizzly bears on these National Forests. A literature review was conducted and a Biological Assessment was written and submitted to the USFWS (Cherry, 2002). A Biological Opinion was received from the USFWS (USDI 2002).

Humans can access some grizzly bear denning habitat in a number of different ways including cross-country skiing, snowshoeing, driving, snowmobiling, hiking and snowboarding. Any of these winter activities has the *potential* to affect denning grizzly bears.

There is a fairly small volume of literature on the effects of winter use on bears, and even less information about the effects of snowmobiles on grizzly bears. Some of the relevant literature is presented here.

Swenson et al. (1997) recommended that humans avoid areas around known active bear dens. They suggested that dens be avoided by 100 m to 1 km, and that disturbance be minimized in areas with high concentrations of dens. Linnell et al. (2000) reviewed the literature on disturbance to denning bears. They concluded that bears tend to select dens 1-2 km away from human activity such as roads and dwellings, and bears seemed tolerant of activities that occurred more than 1 km from the den. Activity closer than 1 km, especially within 200 m of the den, led to variable responses from bears. Bears may abandon dens if activity occurs within this zone, particularly early in the denning season. Bears often den at some distance from where they denned the previous year, indicating that loss of a single denning area due to human disturbance does not always lead to deleterious effects if alternate denning habitat is available within the bear's home range.

The insulating quality of snow (Blix and Lentfer 1992; P. Farnes pers. comm.), and the locations bears chose to den in the Yellowstone area (forested, steep, north aspects with deep snow) (Judd et al. 1986) are such that the degree of disturbance by snowmobiles activity is questionable. The information on impacts to denning bears is largely anecdotal and collected in the course of other research, with few, if any, studies actually designed to look at this phenomenon. The March 2000 Draft of the Grizzly Bear Conservation Strategy for the Yellowstone area concluded that there was insufficient information to call for specific management direction for snowmobile use (ICST 2000).

Snowmobiling has occurred for many years, with gradual increases in use and improvements in technology (J. Kempff pers. comm.). This means the grizzly bears have likely habituated to snowmobile use (Knight and Gutzweiller 1995 p. 114,133) or bears may have moved their den site to another location the next year (Shoen et al. 1987). Grizzly bears are noted to den primarily in remote locations (Judd et al. 1983). Grizzly bears are unlikely to abandon their dens very late into the winter due to the high costs (both energetic and fitness) of doing so (Linnell et al. 2000). It is likely that hibernating bears exposed to meaningless noise (no negative consequences to the bear) habituate to this type of noise (Knight and Gutzweiler 1995 p. 133). A few researchers have found that some bears do, at least on occasion, appear to respond to noise or disturbance near the den site by waking up and moving around in the den (Reynolds et al. 1986; Miller pers. comm. to Dolan). On rare occasions, bears may abandon a den due to some disturbance (Reynolds et al. 1976, Swenson et al. 1997).

Linnell et al. (2000) advised the following:
1) Locate den concentrations.
2) Minimize winter activity in denning areas.
3) If winter activity is unavoidable, it is better to commence activity about the time bears are entering dens so they can choose to avoid certain areas.
4) Confine winter activity to regular routes and valley bottoms.
5) Avoid known den sites by 1 km.
6) Off-route use, which is not predictable, may have more serious impacts than more predictable activities and should be minimized.

The IGBST analysis using the Mahalanobis distance model for suitable denning habitat showed that a large proportion of the Forest, and the Yellowstone area, is comprised of suitable denning habitat. Approximately 25% of the suitable denning habitat is in areas where snowmobile use occurs (Podruzny et al. 2002).

A large proportion of the Yellowstone Grizzly Bear Recovery Zone is protected from snowmobiling. Of the 380 known den locations in the Yellowstone area, between 1975 and 1999, approximately 88% were in areas currently closed to dispersed snowmobile use (USDI 2000). Most of the known den locations (333) were in the Recovery Zone because that is where trapping and radio collaring efforts have been emphasized. Even if not officially protected by being in the National Parks away from designated snowmobile routes or designated Wilderness Areas, many areas are undesirable for snowmobile use due to being forested, too steep, or inaccessible due to terrain. For instance, only about 15% of the Gallatin National Forest in the Recovery Zone is considered desirable for this type of use although 44% of this area is technically open to snowmobiling. Approximately two-thirds of the Gallatin National Forest south of I-90 (approximately 1 million out of 1.5 million acres) meets the definition of "secure" according to the IGBC (1998). About 9% of this "secure" habitat is used by snowmobiles.

Only about 7% of the den sites documented from 1975-99 in the GYA were inside dispersed snowmobile areas or within 500 meters of these areas or snowmobile routes. Data are not available to evaluate the level or timing of snowmobile use associated with each den site during the year it was documented. It is unknown if den sites within snowmobile areas were located in inaccessible micro sites (steep terrain or dense forest) or were potentially available for snowmobile access (Cherry 2002). Monitoring that has been conducted since 2001 has indicated that known grizzly bear dens within areas legally accessible by snowmobiles are typically in locations inaccessible to the machines due to timber or terrain (USDA FS 2004).

Of the known dens sites in the Greater Yellowstone Area, relatively few (12.4%) were found to be in areas near snowmobiling (Cherry 2002). In addition, 82.6% of dens were located >2000 meters from snowmobile use areas. The Gallatin National Forest had eight dens in snowmobile use areas. The Mahalanobis Distance Model predicted that there was a lot of grizzly bear denning habitat available (greater than 60%) in the Forests and federal land in the Greater Yellowstone Area. It also indicated the Gallatin National Forest had 74% of the Recovery Zone that met the denning criteria, and that 68% of the areas where bears occur on the Forest met denning criteria (Podruzny et al. 2002). Over 70% of this suitable denning habitat both in the Recovery Zone and on the Gallatin National Forest where bears occur is legally open to snowmobiling as of 2000. The definition of "secure" habitat in the Grizzly Bear Conservation Strategy (ICST 2003) does not consider snowmobile use in these areas as removing them from secure.

From a practical standpoint, it should be noted that grizzly bears rarely reuse a den. Therefore, protecting actual den locations is infeasible as they change from year to year. Even protecting denning concentrations is infeasible because we only know where 26 dens were located on the Gallatin National Forest during the last 25 years because most trapping and radio collaring efforts occurred in Yellowstone National Park. Protecting potential denning areas means letting the public know why a certain area is closed, and perhaps focusing unwanted attention on grizzly bear denning habitat. This, in and of itself, may pose a risk to the grizzly bear.

It is possible that there could be a potential negative impact from snowmobiles to sows with cubs-of-the-year (COY) upon emergence from their dens than to denning bears. About 60% of sows emerge between the first and fourth weeks of April (USDI 2000). Most emerging bears move

immediately to a known, reliable spring food source, such as a big game winter range (Reinhart and Tyers 1999). However, sows with COY may remain near the den for a period of time. It is possible that snowmobiles could disturb females with cubs at this time of year, although there is no known incidence of this in the Yellowstone area. Depending on where one is on the Gallatin National Forest, snowmobile season ends from March 30 to late May or June in some years at the higher elevations. The conditions that usually force den emergence (melting snow and moisture in the den) are the same conditions that cause poor snowmobiling conditions (Farnes pers. comm.). In many cases the access to snowmobiling on the National Forest has become limited before the emergence dates due to the exposure of mud and rock at lower elevations. A disturbance would have to be severe for a sow to abandon her cubs (Linnell et al. 2000). Although probably quite rare, the potential seriousness of a sow with COY being displaced post-emergence, and perhaps abandoning her cubs, means this type of disturbance should be considered. The IGBST is conducting research on spring emergence habitat for sows in the GYA that will be utilized once it becomes available. Monitoring efforts since 2001 (USDA FS 2004) have not revealed any conflict between snowmobiling and grizzly bear dens or emergent bears.

Although the determination of the 2002 Biological Assessment for the effects of snowmobiling on the grizzly bear in the Yellowstone (Cherry 2002) was 'may affect-likely to adversely affect,' for snowmobiling, this is extremely conservative and based more upon the potential impact of snowmobiling on sows with COY upon den emergence, rather than the effects on denning bears in the Yellowstone area.

Snowmobiling is not a new use or impact but is merely the continuation of an existing use that has been ongoing for many years with few, if any, impacts on either individuals or the population. Although snowmobiling may occasionally affect an individual bear, it is very unlikely to affect the population as a whole, especially a population such as the Yellowstone grizzly bear, which is nearing recovery.

There are a number of key points about grizzly bears and snowmobiling in the Yellowstone Area. The major points are:

1) The grizzly bear population in the Yellowstone area is nearing recovery or has met recovery criteria.
2) Snowmobiles are only one of several means by which humans can access denning habitat in the winter, on or off trails.
3) Snowmobile use has been around for many years, and has increased over a long period.
4) Bears have had a chance to either habituate or move to a new den site if disturbed.
5) Bears tend to den in remote areas with characteristics that are not entirely conducive to snowmobiling (steep, forested habitats).
6) Snow is an excellent sound insulator.
7) A large proportion of the Recovery Zone and area where bears may occur (68 and 63%, respectively) provides suitable denning habitat (2002, Table 3.10. 9).
8) A large proportion of known dens in the Yellowstone area (88%) are located in areas where snowmobile use does not occur (Cherry 2002, Table 3.10. 6, Table 3.10. 7, Table 3.10. 8) and suitable denning habitat is well distributed on the Forests.

9) Within the Recovery Zone, a relatively small percent (16%) of suitable denning habitat is in areas potentially used by snowmachines (Cherry 2002, Table 3.10. 11). In the areas where grizzlies may occur, this increases to 69%.
10) On the five National Forests looked at in depth, only 3-19% of the secure area within the Recovery Zone that is suitable for denning is potentially used by snowmobiles (Table 3.10. 16). In the area where bears may occur, 6-31% falls into this category. The percentages are very similar for secure areas used by snowmobiles without considering whether or not it is suitable denning habitat (Table 3.10. 17). In the National Parks, less than 5% of the total area is open to snowmobiling. This provides a large acreage of suitable denning habitat where no snowmobiling occurs.
11) Information on effects of snowmobiling on bears is largely anecdotal, although there is sufficient information to indicate that some individual bears have the potential to be disturbed.
12) Potential effects of snowmobiling on reproduction and survival of grizzly bears in Yellowstone Park and the Greater Yellowstone Area are not evident in the population statistics.

The determination of the 2002 Biological Assessment on the effects of snowmobiling on grizzly bears was "may affect-likely to adversely affect" (Cherry, 2002). This is because it is not known where all grizzly bear dens are located, and exact snowmobile routes are not predictable. Thus, preventing snowmobiles from traveling near a den site cannot be assured. Snowmobile activity may disturb or displace an individual grizzly bear. Generally, snowmobile effects are not significant, but because of the unpredictability of snowmobile use and the possibility that a snowmobile could affect an individual bear, especially sows with cubs-of-the-year, we could arrive at a "no effect" determination for bears.

The Biological Opinion from the USFWS (USDI, 2002) concluded that the level of snowmobile activity authorized in 2002 on the Forests (including Custer, Shoshone, Gallatin, B-D and B-T) was not likely to jeopardize the continued existence of the grizzly bear. The best information suggests that current levels of snowmobile use are not appreciably reducing the likelihood of either the survival or recovery of grizzly bears in the Yellowstone recovery zone. They based this on the facts that direct and indirect of snowmobiles on grizzly bears are not well documented, grizzly bears may habituate to disturbance, and that population parameters for Yellowstone grizzly bears are excellent among other things.

Graves and Reams (2001) edited the output of an expert workshop for protocols to monitor snowmobile effects on wildlife. Several issues to monitor were identified for Ursids. These included the effect of presence on emerging animals and the effect of noise on hibernating bears. It appears that although it is important to understand population level effects,that most information available is on individual effects. The expert group discussing bears decided that impact to emergent bears is higher than bears still within their dens. They also believed that determining if bears are avoiding denning in snowmachine use areas is impossible to determine. Possible effects listed by this group were disturbance for emerging family groups before young are mobile, increased movement and energetic costs, and displacement from habitat. Other possible effects of noise for denning bears include den abandonment, loss of young, increased energetic costs, death, learned displacement from denning areas were snowmachine use occurs. Determining where bears are denning and what areas snowmobiles are using are basic steps to understanding effects on bears.

We have attempted to do this in the Yellowstone area (Cherry 2002). In addition, monitoring of spring snowmobile use and known grizzly bear dens is continuing. At this time (2006), there have been no conflicts between denning or emerged bears and snowmobiles. Even with monitoring efforts, there has been no evidence found that snowmobiles affect grizzly bears that are either denning or emerging from dens. In addition, the Forest and other cooperators will continue to monitoring known den sites and snowmobile use (USDA FS 2004). If any conflict is discovered, appropriate mitigation measures will be taken. Grizzly bears are not a legitimate reason to curtail snowmobile use in the spring. .

The Travel Plan management alternatives have different effects on the amount of acres of the Gallatin National Forest open to snowmobiling. For this discussion, the acres of area that are legally closed to snowmobiling either seasonally or yearlong are presented. There are additional acres that, although they are technically open, may not really have snowmobile use due to being heavily forested, having terrain that cannot be negotiated by snowmobile, or generally have too little snow accumulation for snowmobiling to occur.

Winter Non-Motorized Use

There is little literature on the effects of winter non-motorized use on grizzly bears. Therefore, some of this literature is from research on brown bears in other climates or black bears and with in different climates and using different den types.

Swenson et al. (1997) believed that fall hunting, which occurs early in the European brown bear denning period in Sweden, may contribute to fall disturbance and early den abandonment by brown bears. They suggest that bears may be more tolerant of industrial activity located some kilometers from the den, but not of humans or human related activity near or at the den site. A number of the human activities at or near the den site were not motorized (i.e. hunting, survey work, shooting, and fishing at or near the den, and a dog at the den site, etc.). Swenson et al. (1997) found that there was no significant difference in den abandonment in a 'protected area' versus areas where there was military activity and timber harvest. They also found that when there was some type of human activity at or within 100 m of den sites, 12 of 18 dens were abandoned.

Craighead and Craighead (1972) apparently caused den abandonment by a female grizzly bear in the fall that they tracked to within 200 ft of its den.

Kolenosky and Strathearn (1986) found that rates of black bear den abandonment in Ontario were inversely related to duration of denning. In other words, den abandonment is much more likely early in the fall than any other time. Smith (1983) also found that black bears (6 of 9) abandoned their dens less than 2 weeks after den entry, but bears within the dens more than 4 weeks (n = 12) did not abandon their dens. This study was in a mild climate where many bears use tree dens and even den in the open (on the ground), and there is no snow. Beecham et al. (1983) also found that den abandonment was inversely related to the length of time that the bear had been denned. Reynolds et al. (1976) and Tietje and Ruff (1980) also found this for black and brown bears.

Goodrich and Berger (1984) cite 3 cases of black bear cub abandonment (out of 12 cases of den abandonment) - one after researchers entered the den to radio-collar the female and two as researchers approached the den. They conclude, "Since the quiet approach of investigators

sometimes causes abandonment of dens and cubs (this and other studies; Manville 1983, Kolenosky and Strathearn 1987), skiing and other recreational activities could have the same or a heightened effect." Den site abandonment in response to investigator disturbance occurred at both study areas, and all but one disturbed bear remained active after abandonment. Applications of the findings of this study to grizzly bears should be made with caution because these black bears were most commonly denning in trees, either at the base or in elevated tree dens, rock dens, and in some cases in logs, brush piles or on the ground, which can occur when winters are relatively mild. The time of year for den abandonment was not provided.

Direct and Indirect Effects

Analysis Methodology

There is a difference in the way in which the CEM Access map was prepared and the way in which the travel plan alternatives were prepared. The CEM Access map includes a one-mile buffer around each bear subunit that is included in the calculation of route density for the subunit. This one-mile moving window extends outside the Forest boundary for subunits lying on the boundary, includes adjacent subunits on the Forest, and includes non-Forest Service routes in these areas (see attached maps). The maps for the travel plan alternatives do not include any access routes beyond the Forest boundary unless they are on the Gallatin National Forest. These routes within the 1 mile moving window of the GIS model add to the route density categories or subtract from secure, as the case may be. Both the CEM values and Forest Travel Plan Alternatives include federal, private, state and county roads on the Forest. Calculations include private land acreage within the Forest boundary on the Gallatin National Forest. Land outside of the Gallatin National Forest has no road density values. It is ***only appropriate to compare these secure habitat numbers across all seven alternatives to determine which alternative has the most secure habitat or motorized access in grizzly bear habitat and which has the lest because Alternative 1 may or may not match CEM for the reasons presented***. The numbers presented in the alternatives are the portion over which the Gallatin National Forest has jurisdiction.

Alternative 1 is what is legally available to the public for travel on the 1999 Forest visitor map and is the 'no action' alternative. Under this Alternative, the OHV rule is not in place which means that off-route travel is legal, there is no travel plan, and routes are not designated. Alternative 2 is the closest alternative to what people are actually currently doing on the ground with the OHV rule in place, making off-route travel illegal and designating routes if it is selected. Alternative 2 is sort of a 'snap shot' of current use, but with a travel plan in place as its main action. Under Alternative 2, and all the other action alternatives (3-7M), project routes are expected to go out of use over time. Many of them are already grown in and are impassable or have been obliterated. Under all action alternatives (2-7M), administrative routes will be closed to all but administrative use and gated to the public. Under Alternative 1, all motorized routes (including project and administrative) are counted as open to the public.

Under Alternatives 2-7M, in subunits where there are administrative roads, there is a difference between TMARD and OMARD with OMARD density figures being lower. TMARD counts all roads, while OMARD drops administrative roads. Use of administrative roads is limited and should not be viewed the same as a road that is open to the public, and administrative roads are gated. The motorized route density categories of most interest to agencies involved in grizzly bear management

are when TMARD is greater than 2 mi/sq mi and when OMARD is greater than 1 mi/sq mi (ICST 2003). The higher the density of public motorized routes, the less likely a grizzly bear is to use an area.

Although all types of motorized vehicle routes count the same in the access model and CEM, there is likely to be a difference among types and frequencies of use. For instance, a State highway with numerous vehicles at high speeds may not have the same effect on wildlife as a seasonal, rarely used, motorcycle route. However, little research appears to show this distinction. Effects on grizzly bears are complicated by habituation, cover, habitat quality, and other variables. Seasonal closures are not considered in depth in this analysis.

A number of the subunits lying all or in part on the Gallatin National Forest have a high amount of secure habitat (89% or higher in CEM) (Table 3.10. 2a). These are Boulder/Slough #1 and #2, Hellroaring #2, and Lamar #1. Other subunits above 70% secure habitat (in CEM) include Crandall/Sunlight #1 and #2, Hellroaring #1, Hilgard #1 and #2, and Madison #1. There are three subunits that the Conservation Strategy (ICST 2003) designates as "in need of improvement" in amount of secure habitat that currently have less than 70% secure habitat. These are subunits Gallatin #3 at 55% in CEM, Henrys Lake #2 at 46%, and Madison #2 at 67%. Plateau #1 subunit has a 69% secure value in CEM, but the Gallatin National Forest includes only a small portion of this subunit. It should be noted that the calculations for our travel plan alternatives for each subunit do include the portion under adjacent federal management, such as other National Forests or Yellowstone National Park., but do not count routes on these lands. That is one reason why it is correct to only compare the numbers among Alternatives 1 through 7M, and consider that Alternative 1 compares with CEM but may not match those numbers.

The current condition is actually a combination of Alternatives 1 and 2, however Alternative 2, as an action alternative, shows the effects of closing project roads. These alternatives most accurately reflect what was on the ground in 1998 and what is currently on the ground. TMARD and OMARD can be compared among alternatives. TMARD is comprised of all motorized routes of all jurisdictions (FS, state, county, private, etc.) in the subunits. OMARD drops only administrative routes from route density. The direction in the Conservation Strategy (ICST 2003) focuses on secure habitat, however, we have also presented TMARD >2 mi/sq mi and OMARD > 1 mi/sq mi for the subunits.

To analyze snowmobiling and its potential effects on grizzly bears, the acres and percentages of Travel Planning Areas (TPAs) with yearlong and seasonal closures to snowmobiles were reviewed. The TPAs were also combined upward into mountain ranges. Under all action alternatives, the percentage of the Forest legally open to snowmobiling yearlong is reduced from the present.

Effects of Summer Motorized Use by Grizzly Bear Subunit

Boulder/Slough #1 and #2

Throughout the following discussion, Alternative 1 is without the OHV EIS decision in place, which would allow off-road vehicle use to continue.

Effects common to all alternatives
Two of the simplest subunits to address are the Boulder/Slough #1 and #2. Under the CEM Access Model, these had 96.6% and 97.7% secure habitat, respectively (Table 3.10. 5.). Both of these subunits have very high percentages of secure habitat and low motorized route densities under all alternatives. Because these subunits have no administrative roads, TMARD and OMARD percentages are the same for each subunit.

Table 3.10. 5. Total Motorized Access Route Densities (TMARD), Open Motorized Access Route Densities (OMARD), and percent secure habitat of the Boulder/Slough #1 and #2 Grizzly Bear Subunits. These numbers include all road jurisdictions (FS, State, County, Private, etc).

Boulder/Slough #1 OMARD and TMARD	**CEM**	**Alt. 1**	**Alt. 2**	**Alt. 3**	**Alt. 4**	**Alt. 5**	**Alt. 6**	**Alt. 7M**
Percent Secure	96.6	96.3	96.4	96.4	96.4	96.7	96.7	96.6
Density Percent: >1 mi/sq mi	2.5	2.3	2.3	2.3	3.3	2.2	2.2	2.3
Density Percent: >2 mi/sq mi	0	0	0	0	0	0	0	0
Boulder/Slough #2 OMARD and TMARD	**CEM**	**Alt. 1**	**Alt. 2**	**Alt. 3**	**Alt. 4**	**Alt. 5**	**Alt. 6**	**Alt. 7M**
Percent Secure	97.7	100	100	100	100	100	100	100
Density Percent: >1 mi/sq mi	0	0	0	0	0	0	0	0
Density Percent: >2 mi/sq mi	0	0	0	0	0	0	0	0

Boulder/Slough #1 lies entirely in the Absaroka Beartooth Mountains on the Gallatin National Forest and varies only a small amount across alternatives. This subunit is almost entirely Wilderness. The small amount of road density occurs due to the Main Boulder road, the Iron Mountain Road to the northeast part of the subunit, and the Lake Abundance Road to the southeast which are within the 1 mile window of the Access model. The difference among the percentages from CEM and the alternatives is in the very southeast portion of the subunit near Cooke City and varies depending on the management of the Lake Abundance Road, which is actually not in this subunit, but is picked by the 1 mile moving window. There is no road density in the >2 mi/sq mi category in any alternative. Without consideration of roads under National Forest jurisdiction, there is 97% secure habitat, therefore, the Forest motorized routes detract slightly from secure and add only slightly to route densities.

Boulder/Slough #1

Alternative 7M has 96.6% secure habitat, 2.3% of the subunit is in the > 1 mi/sq mi density category. There is no route density >2 mi/sq mi. This is a slight improvement over both Alternatives 1 and 2.

Boulder Slough # 2

Effects common to all alternatives

The Boulder/Slough #2 subunit, also in the Absaroka Beartooth Mountains, is shared between the Gallatin National Forest and Yellowstone National Park. The portion on the Forest is 100% secure habitat and is entirely Wilderness. There is no difference among the Gallatin Forest Travel Plan alternatives in percent secure habitat because there are no motorized routes on the National Forest in this subunit.

Crandall/Sunlight #1 and #2

The Crandall/Sunlight subunits #1 and #2 lie on the eastern side of the Gallatin National Forest and are shared with the Shoshone National Forest. The Gallatin National Forest has a small proportion of both subunits, especially for Crandall/Sunlight #2. Crandall/Sunlight #1 and #2 are 81.1% and 82.3% secure habitat in CEM, respectively.

Under CEM, Alternatives 1 and 2 are considered to be an approximation of the current condition on the ground. These percent secure figures do not compare directly with the CEM secure figures because for the Alternatives the roads on the Shoshone National Forest roads are not considered in the calculations. Therefore, the percentages for Alternatives 1 and 2 should be used for comparison to the other alternatives to determine if there is an increase or decrease in secure or percent of area affected by road densities. The alternatives are all very similar. The highest road density in the Gallatin portion of the subunit is primarily related to Highway 212 and development on private land. There are no project or administrative roads within these subunits that make any contribution to road densities, therefore, OMARD and TMARD are the same.

Table 3.10. 6 Total Motorized Access Route Densities (TMARD), Open Motorized Access Route Densities (OMARD), and percent secure habitat of the Crandall/Sunlight #1 and #2 Grizzly Bear Subunits. All road jurisdictions are included, private, county, state and FS.

Crandall/Sunlight #1 TMARD and OMARD	**CEM**	**Alt. 1**	**Alt. 2**	**Alt. 3**	**Alt. 4**	**Alt. 5**	**Alt. 6**	**Alt. 7M**
Percent Secure	81.1	96.0	96.3	96.1	96.1	96.7	96.7	96.3
Density Percent: >2 mi/sq mi	4.0	1.1	1.1	1.1	1.1	1.1	1.0	1.1
Density Percent > 1 mi/sq mi	16.3	3.0	3.0	3.4	3.3	2.4	2.3	2.9
Crandall/Sunlight #2 TMARD and OMARD	**CEM**	**Alt. 1**	**Alt. 2**	**Alt. 3**	**Alt. 4**	**Alt. 5**	**Alt. 6**	**Alt. 7M**

Percent Secure	82.3	99.7	99.7	99.7	99.7	99.7	99.7	99.7
Density Percent: >2 mi/sq mi	5.5	0	0	0	0	0	0	0
Density Percent >1 mi/sq mi	13.6	0.1	0.1	0.1	0.1	0.1	0.1	0.1

Crandall/Sunlight #1

Alternative 7M has 96.3% secure habitat, and 3.4% of the subunit in the > 1 mi/sq mi density category and 1.1% in the >2 mi/sq mi category. This Alternative has the same percent secure as Alternative 2, but more secure than Alternative 1. It has the same density in the >2 mi/sq mi as Alternatives 1 and 2, and is slightly lower in the > 1mi/sq mi density category than Alternatives 1 and 2.

Crandall/Sunlight #2

For Crandall/Sunlight #2, there is no difference on the Gallatin National Forest in secure habitat (99.7%) among alternatives. The small portion of the subunit on the Gallatin National Forest is most affected by Highway 212.

Lamar #1

A small portion of Lamar #1 subunit lies on the Gallatin National Forest, and the remainder lies in Yellowstone Park and the Custer National Forest. Under the CEM Access Model, this subunit has 89.4% secure habitat, and under Alternatives 1 and 2 (closest to 1998 baseline), are 93.9-94.5% secure, respectively
Table 3.10. 7). The analysis for this subunit includes the small portion of the Custer National Forest in this area administered by the Gallatin National Forest. The effects of the heavily motorized Cooke City area are somewhat compensated for by large non-motorized parts of the Lamar #1 subunit. However, the area around Cooke City and to the north provides some good quality bear habitat (Table 3.10. 2a and Table 3.10. 3). Cooke City has also been an area of high grizzly bear mortality in the past. Although this subunit has very high percentages of secure habitat under all alternatives, some alternatives produce more secure and are more responsive than other alternatives to bear habitat quality and road management. This subunit is bisected by Highway 212.

Table 3.10. 7 Total Motorized Access Route Densities (TMARD), Open Motorized Access Route Densities (OMARD), and percent secure habitat of the Lamar #1 Grizzly Bear Subunit. (All road jurisdictions are included.)

Lamar #1 TMARD and OMARD	CEM	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7M
Percent Secure	89.4	93.9	94.5	94.4	94.4	95.2	95.1	94.5
Density Percent: >2 mi/sq mi	3.2	3.7	3.5	3.6	3.6	3.4	2.6	3.6

Density Percent > 1 mi/sq mi	6.9	5.4	5.0	5.3	5.3	4.7	4.2	5.3

Alternative 7M has 94.5% secure habitat, a motorized route density of 3.6% of the subunit in the > 1 mi/sq mi category and > 5.3 in the >2 mi/sq mi category. This has more secure habitat and less road densities in the higher categories than Alternative 1. Under Alternative 7M there is a new ATV/motorcycle route #3226 near Miller Creek and a small connecter to #3223 that are not found in Alternatives 1 or 2. Several small project roads (i.e. #570) will no longer exist under implementation of Alternative 7M, which compensate for these small additions.

Hellroaring/Bear #1 and #2

The Hellroaring/Bear #1 and #2 subunits lie east of Gardiner in the Absaroka Beartooth Mountain range. The Hellroaring Bear #1 and #2 subunits have 77% and 99.5% secure habitat, respectively, under the CEM Access Model (Table 3.10. 8). Hellroaring/Bear #1 is located partially inside the Wilderness. Hellroaring/Bear #1 has some project roads that will be gone under full implementation of any of the action alternatives. This is the primary difference between Alternatives 1 and 2 for TMARD and OMARD

The Hellroaring/Bear #2 subunit is entirely in Wilderness. In Hellroaring/Bear #2, the only area of motorized route density lies at the edge of the Wilderness in the Mill Creek drainage. Hellroaring/Bear #1 shows some slight differences amongst the alternatives.

Table 3.10. 8 Total Motorized Access Route Densities (TMARD), Open Motorized Access Route Densities (OMARD), and percent secure habitat of the Hellroaring/Bear #1 and #2 Grizzly Bear Subunits (Including all road jurisdictions).

Hellroaring/Bear #1 TMARD	**CEM**	**Alt. 1**	**Alt. 2**	**Alt. 3**	**Alt. 4**	**Alt. 5**	**Alt. 6**	**Alt. 7M**
Percent Secure	77	75.1	79.5	81.3	81.3	81.3	81.3	80.4
Density Percent: >2 mi/sq mi	13.5	13.2	11.2	11.2	10.1	10.1	10.1	10.0
Density Percent > 1 mi/sq mi	20.8	18.3	17.2	16.8	16.8	16.6	16.6	16.5
Hellroaring/Bear #2 TMARD	**CEM**	**Alt. 1**	**Alt. 2**	**Alt. 3**	**Alt. 4**	**Alt. 5**	**Alt. 6**	**Alt. 7M**
Percent Secure	99.5	98.1	98.5	98.5	99.0	99.0	99.0	99.7
Density Percent: >2 mi/sq mi	0	0	0	0	0	0	0	0
Density Percent >1 mi/sq mi	0	0.4	0.2	0	0	0	0	0

Hellroaring/Bear #1

Alternative 7M has 80.4% secure habitat for OMARD and TMARD, and TMARD of 10.0% in the >2 mi/sq mi route density category. For OMARD this alternative has 16.5% in the >1 mi/sq mi road density category. This alternative provides more than the amount of secure habitat that presently exists (in Alternatives 1 and 2) and less motorized route density in the higher density categories for OMARD and TMARD. This alternative includes an administrative route in the vicinity of Red Mountain south of the State Dome Mountain Wildlife Management Area not seen in other alternatives. This was an error of omission and is actually the same in all action alternatives. Although the overall secure and density percentages for this subunit look fairly good, the non-Wilderness and non-Park portions of the subunit are fairly heavily motorized under all alternatives.

Hellroaring/Bear #2

The differences among the alternatives for this subunit are entirely due to motorized access adjacent to the boundary of the Wilderness to the north in Mill Creek at the East Fork of Mill Creek, Passage Creek, Colley Creek and Lambert Creek. This subunit has 99.5% secure habitat under CEM.

Alternative 7M has 99.7% secure habitat and 0% in the road density categories. This is an improvement over Alternatives 1 and 2.

Gallatin #3

The Gallatin #3 subunit is located in the southern part of the Gallatin Range, and is shared with Yellowstone Park. The vast majority of this subunit lies within the Gallatin National Forest. The CEM Access value for secure habitat in this subunit is 55.3% (Table 3.10. 9). This is one of the subunits in the Yellowstone Area designated "in need of improvement" in the Grizzly Bear Conservation Strategy (ICST 2003). The Gallatin #3 subunit can only improved to a certain point due to the presence of many non-Forest Service routes and their effects on this subunit (Table 3.10.2.b). This subunit has many non-Forest Service routes, especially on the east side of the subunit, and has state highways that bound the subunit on the east and west sides. These routes affect secure habitat by dropping it to 81% before even considering the effect of National Forest routes. All alternatives improve the percentage of secure habitat available in this subunit.

Table 3.10. 9 Total Motorized Access Route Densities (TMARD), Open Motorized Access Route Densities (OMARD), and percent secure habitat of the Gallatin #3 Grizzly Bear Subunit. (All road jurisdictions are included.)

Gallatin #3 TMARD	CEM	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7M
Percent Secure	55.3	54.4	59.4	60.1	62.2	71.8	81.0	70.2
Density Percent: >2 mi/sq mi	16.9	15.4	14.0	14.1	12.1	10.9	10.6	11.7
Density Percent >1 mi/sq mi	41.0	36.4	35.0	33.9	32.7	24.6	17.4	24.9

Alternative 7M has 70.2% secure habitat, and it has a TMARD of 11.7% in the >2 mi/sq mi route density category. For OMARD, this alternative has 24.9% in the >1 mi/sq mi route density category. Alternative 7 is a substantial improvement over the current condition (Alternatives 1 and 2). The main changes in between Alternative 7 and Alternatives 1 and 2 are removal of motorized use from much of the southern part of the subunit, and a reduction in motorized use on the east side of the Gallatin Crest. This creates two fairly large pieces of secure habitat that do not currently exist. This alternative comes very close to meeting or exceeding 70% secure, although there are some slight differences between CEM and how the alternatives are compared. Under this Alternative, some of the Gallatin Crest Trails (#82, 185, 187, 186, 96 seg. 1, 434, 427) and Porcupine Buffalo trails (#1, 199, 466, 34, 120, 160, 194, 66) open July 15 and close September 5 to motorcycle use. The early fall closure is primarily due to protecting this valuable fall area for grizzly bear use of whitebark pine.

Hilgard #1 and #2

The Hilgard #1 and #2 subunits lie on the west side of the Gallatin National Forest in the Madison Mountain range. Hilgard #1 is shared with the Beaverhead-Deerlodge National Forest, and the entire part lying on the Beaverhead-Deerlodge is in the Lee Metcalf Wilderness. A small piece of Hilgard #2 lies within Yellowstone National Park. The CEM shows secure percentages at 69.8% and 71.5%, respectively for these two subunits (Table 3.10. 10). The large difference between OMARD and TMARD percentages reflect the extensive administrative routes in this subunit.

Table 3.10. 10 Total Motorized Access Route Densities (TMARD), Open Motorized Route Density (OMARD), and percent secure habitat of the Hilgard # 1 and #2 Grizzly Bear Subunits. Includes all road ownerships, FS, Private, etc.

Hilgard #1 TMARD	CEM	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7M
Percent Secure	69.9	75.0	78.6	78.6	81.1	81.7	89.2	81.1
Density Percent: >2 mi/sq mi	12.4	9.9	5.9	5.9	5.1	4.9	2.9	4.9
OMARD Density Percent > 1mi/sq mi	25.0	19.4	15.4	15.4	14.3	11.0	6.7	14.2
Hilgard #2 TMARD	CEM	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7M
Percent Secure	71.5	78.7	81.8	81.8	81.3	82.9	90.2	83.1
Density Percent: >2 mi/sq mi	10.3	2.9	2.9	2.9	2.8	2.4	1.8	2.8
OMARD Density Percent: Total > 1mi/sq mi	22.0	14.2	11.2	11.2	11.8	9.5	5.1	9.4

Hilgard #1

Alternative 7M has 81.1% secure habitat, and it has a TMARD of 4.9% in the >2 mi/sq mi route density category. For OMARD, this Alternative has 19.4% in the >1 mi/sq mi route density category. This alternative has decreases in the higher motorized route density categories and increases secure habitat over the current condition. Compared to Alternative 1, it provides a block of secure habitat in the Marble Lake area but adds a motorcycle and ATV route on the Forest just south of Big Sky in the Yellow Mules area. Some of the trails in the Hilgard #1 subunit become motorcycle only rather than ATV and motorcycle that they are presently. Trails north of Taylor Fork are restricted to motorized use from 9/15 to 6/15 to protect for big game (calving) and grizzly bear (hunting season and fall habitat) reasons.

Hilgard #2

The Hilgard #2 subunit is partially comprised of the Monument Mountain part of the Lee Metcalf Wilderness on the east side of the subunit.

Alternative 7M has 83.1% secure habitat, and it has a TMARD of 2.8% in the >2 mi/sq mi route density category. For OMARD, this Alternative has 9.4% in the >1 mi/sq mi route density category. This alternative is almost the same as Alternative 2 except that Slide Creek Trail #71 becomes non-motorized. Alternative 7 is an improvement over the current condition represented by Alternatives 1 and 2. In addition, part of Trail #74 is closed to motorized use while Trail #203 is opened to motorized use. Trail #203 is mostly open to motorcycle use and not ATVs. Trails south of Taylor Fork are restricted to motorized use from 9/15 or 10/15 to 6/15 to protect for big game (calving) and grizzly bear (hunting season and fall habitat) reasons.

Madison # 1 and #2

The Madison subunits #1 and #2 are shared with Yellowstone Park, and lie at the southern end of the Madison mountain range. Madison #2 is one of the subunits in the Conservation Strategy (ICST 2003) that is termed "in need of improvement." The CEM Access Model secure values for Madison #1 and #2 are 71.5% and 66.5%, respectively (Table 3.10. 11). Most of the secure habitat for both of these subunits lies within Yellowstone Park, with some secure habitat in Madison #1 on the Forest, but almost no secure habitat in Madison #2 on the Forest. Madison #1 subunit which includes the Cabin Creek Wildlife Management Area, is high quality grizzly bear habitat, however, most of the secure habitat in this subunit lies within Yellowstone National Park or in the Lee Metcalf Wilderness.

Table 3.10. 11 Total Motorized Access Route Densities (TMARD), Open Motorized Access Route Densities (OMARD) and percent secure habitat of the Madison # 1 and #2 Grizzly Bear Subunits. (All road jurisdictions are included).

Madison #1 TMARD	CEM	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7M
Percent Secure	71.5	75.4	79.1	82.2	83.2	83.4	89.6	83.7
Density Percent: >2 mi/sq mi	22.3	6.5	4.8	4.3	3.9	3.5	3.8	3.9
Madison #1 OMARD	CEM	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt.

								7M
Density Percent: Total >1 mi/sq mi	24.6	19.5	17.2	14.4	13.0	11.6	8.0	12.4
Madison #2 TMARD	CEM	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7M
Percent Secure	66.5	66.7	71.7	71.7	71.7	71.7	71.7	71.8
Density Percent: >2 mi/sq mi	22.3	29.1	17.5	17.5	17.5	16.9	17.5	17.4
Madison #2 OMARD	CEM	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7M
Density Percent >1mi/sq mi	31.7	32.9	26.3	26.3	26.4	21.5	19.9	26.5

Madison #1

Alternative 7M has 83.7% secure habitat, and it has a TMARD of 3.9% in the >2 mi/sq mi route density category. For OMARD, this Alternative has 12.4% in the >1 mi/sq mi route density. This is an increase in secure habitat and a decrease in the higher motorized route densities over the current condition. Because of its high quality habitat, and the fact that most of the secure habitat for this subunit exists in either Yellowstone National Park or the Lee Metcalf Wilderness, increasing the percent secure habitat on the portion of the subunit on the National Forest is important. Several large pieces of secure habitat are created under this Alternative, which is highly beneficial to grizzly bears. Alternatives 5 and 7M remove the ATV route that connects to the Taylor Fork. This does not make a very noticeable numerical difference in the percent secure habitat among the alternatives, but may be very important to the human use patterns of this subunit and secure grizzly bear habitat. In addition, motorized routes in the Cabin Creek area are generally restricted until either 6/16 or 7/16 (to benefit elk calving primarily) and close to motorized use on 9/15 or 10/15 to reduce hunter conflicts and protect fall grizzly bear habitat such as whitebark pine.

Madison #2

For Madison #2, the CEM and existing condition in the alternatives secure percentages are fairly close (Table 3.10. 11). This is one of the subunits that has been termed “in need of improvement”. The CEM percent secure is 66.5%. As mentioned above, most of the secure habitat is in Yellowstone Park. There is almost no secure habitat on the Gallatin National Forest. This is a subunit with fairly poor habitat effectiveness and habitat value (Table 3.10. 2a and Table 3.10. 3). This subunit is comprised of relatively poor habitat (Tables 3.10. 12 and 3.10.4) and also has been a place in which bears tend to find attractants due to the high human use of this area (Gunther et al. 2004). Improvement of secure habitat and road densities in this area is of questionable value due to the risk to grizzly bears when they venture into this subunit that is so heavily used by humans.

This Alternative has 71.8% secure habitat, and it has a TMARD of 17.4% in the >2 mi/sq mi route density category. For OMARD, this Alternative has 26.5% in the >1 mi/sq mi route density. All action alternatives for Madison #2 are very similar and an improvement over Alternative 1 because the project roads go out of use. This improvement brings this subunit close to or exceeding 70%

secure, however, most of the secure habitat lies within Yellowstone National Park to the east. A route (#2530) that is currently open to motorized use on Horse Butte is changed to a project road under this alternative indicating that it will go out of public use. In Alternatives 1-6, the Rendezvous Ski Trail routes, located just south of West Yellowstone, were inadvertently omitted administrative routes. These routes are maintained infrequently by motorized vehicles in the summer to remove downfall and trim trees growing into the trails. This was corrected for Alternative 7M for this issue, and it is the same across all alternatives for this issue. This means that all alternatives have 71.8% secure, and there is very little difference among the action alternatives.

Plateau #1

A small portion (about 15%) of the Plateau #1 subunit lies on the Gallatin National Forest. Most of this subunit is in the Caribou-Targhee National Forest and Yellowstone Park. The portion in the Park is almost entirely secure habitat, and the portion on the Caribou-Targhee has several large pieces of secure habitat. The percent secure in CEM and the Conservation Strategy is 68.9% (Table 3.10. 13). The noticeable differences among the alternatives for Plateau #1 are because Alternatives 1-7M analyzed only routes on the Gallatin National Forest and used no motorized routes for the Park and Caribou-Targhee. However, the CEM secure habitat and Alternatives 2 and 7 (both over 90%) appear to be the same on the Gallatin National Forest. The >90% secure figure for Alternative 2 is misleading because the subunit, in its entirety, has much less secure habitat. Therefore, the best way to look at these figures is to compare only among the Alternatives to see if there is improvement or not rather than looking at the CEM percentages.

Table 3.10. 13 Total Motorized Access Route Densities (TMARD), Open Motorized Access Route Densities (OMARD), and percent secure habitat of the Plateau # 1 Grizzly Bear Subunit. All route jurisdictions are included.

Plateau #1 TMARD	CEM	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7M
Percent Secure	68.9	92.1	93.8	93.8	93.8	93.8	93.8	93.8
Density Percent: >2 mi/sq mi	9.6	4.3	1.4	1.4	1.4	1.4	1.4	1.4
OMARD Density Percent > 1 mi/sq mi	28.3	5.4	2.8	3.3	3.3	3.3	3.3	2.4

Alternative 7M has 93.8% secure habitat, and it has a TMARD of 1.4% in the >2 mi/sq mi route density category. For OMARD, this Alternative has 2.4% in the >1 mi/sq mi route density. As previously discussed, the 92% secure figure is misleading. The Gallatin National Forest comprises only about 15% of this subunit. Routes on the Caribou-Targhee were excluded from the alternatives, giving it the appearance of a highly secure subunit, when in fact only the Yellowstone Park portion of the subunit has a large proportion of secure habitat. Alternative 7M is an improvement over Alternative 1 and a very slight improvement over Alternative 2. Motorized use

on Two Top Trail is restricted until 7/15 and will benefit grizzly bear spring/early summer habitat. Motorized use restrictions on Cream Creek #1703 seg. 2, E. Cream Road #987, South Fork Madision Road #478, and Beaver Pone Road #1723 until 6/16 will also benefit grizzly bear spring/summer habitat.

Henrys Lake #2

The Henrys Lake #2 subunit lies on the southwest part of the Gallatin National Forest in the Henrys Mountains and is shared with the Caribou-Targhee National Forest. The CEM secure habitat value for Henrys Lake #2 is 45.7% (Table 3.10.14). With Henrys Lake #2, as with Plateau #1 subunit, the Caribou-Targhee routes are only present in the CEM data and not in the Gallatin Forest travel alternatives. Most of the secure habitat lies on the Caribou-Targhee portion of this subunit. The percentages derived from secure and the alternatives do not match CEM since only the Gallatin portion of the subunit counts motorized routes. The Park and Targhee are counting as non-motorized and totally secure. The way to look at the change across alternatives is to compare the percentages for the alternatives, using 1 and 2 as the existing condition to see if there is improvement. The east side of the subunit remains fairly heavily motorized under all alternatives. The Henrys Lake #2 subunit is one of those designated "in need of improvement" in the Conservation Strategy (ICST 2003). This subunit overlaps the Lionhead TPA, which is an area of concern as a wildlife corridor from east to west toward Raynolds Pass. Part of the Lionhead TPA is outside of the Recovery Zone and therefore outside of the subunit. Travel through the eastern part of this subunit and Lionhead TPA could be problematic for grizzly bears and other species, due to high motorized route densities throughout almost the entire east side of the subunit from north to south. There are motorized use restrictions on Contour Road #1718, W. Fork Denny Creek Road #1735 until 6/16 are beneficial for spring habitat for grizzly bears and big game.

Table 3.10. 14 Total Motorized Route Densities (TMARD), Open Motorized Route Densities (OMARD), and percent secure habitat of the Henrys Lake #2 Grizzly Bear Subunit. (All route jurisdictions included).

Henrys Lake #2 TMARD	CEM	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7M
Percent Secure	45.7	52.7	57.7	57.7	58.8	64.5	67.5	62.5
Density Percent: >2 mi/sq mi	28.3	29.0	21.1	21.1	20.7	17.2	15.7	19.0
Henry's Lake #2 OMARD								
Density Percent > 1 mi/sq mi	46.1	36.5	28.0	28.0	27.4	22.6	22.3	25.1

Alternative 7M has 62.5% secure habitat, and it has a TMARD of 19.0% in the >2 mi/sq mi route density category. For OMARD, this Alternative has 25.1% in the >1 mi/sq mi route density. This Alternative is an improvement over both Alternatives 1 and 2, the current condition. It improves the subunit over the current level of secure habitat mostly on the west side of the subunit. Some routes within this subunit (#218 and parts of #215) are closed to motorized use under this Alternative. Several routes become project routes and will go out of public use (#2540).

Areas of the Gallatin National Forest Outside of the Recovery Zone

The portions of the Gallatin National Forest south of Interstate-90 but outside of the Recovery Zone were also analyzed. This is because grizzly bears are moving into these areas. The exception to this analysis is two small areas (part of the Beartooth Plateau and the Hilgard Basin) that are non-motorized and are surrounded by the Recovery Zone. Because these areas are non-motorized, there is no need to conduct an analysis for secure habitat since they should be totally secure. The areas analyzed south of I-90 are analyzed with all route ownerships (federal, state, county and private) (Tables 14-16). The area outside the National Forest boundary does not count toward road density. The Draft Conservation Strategy (2005) requires that only secure habitat be monitored outside of the PCA. Therefore, secure habitat is what this analysis is based upon. There are no CEM data for these areas, because CEM Access data does not exist for the parts of the Forest outside of the Recovery Zone. The Grizzly Bear Conservation Strategy calls for monitoring only secure habitat in areas outside of the PCA where grizzly bears occur.

Alternative 1 is what is legally available to the public on the 1999 Forest visitor map and is the 'no action' alternative. Under this Alternative, the OHV rule is not in place which means off-route travel is legal, there is no travel plan, and routes are not designated. Alternative 2 is the closest alternative to what people are actually currently doing on the ground with the OHV rule in place and making off-route travel illegal and designating routes. Alternative 2 is sort of a 'snap shot' of current use, but with a travel plan in place as its main action. Under Alternative 2, and all the other action alternatives (2-7), project routes are expected to go out of use over time. Many of them are already grown in and are impassable or have been obliterated. Under all action alternatives (2-7), administrative routes will be closed to all but administrative use and gated to the public. Under Alternative 1, all motorized routes are counted as open to the public.

Mile and Sheep Creek

The Mile and Sheep Creek portions of the Henrys Mountains are located west of Henrys Lake Subunit #2 on the Gallatin National Forest, and are part of the Lionhead TPA. The Lionhead TPA is believed to be the wildlife corridor for east to west movement of animals to and from the area west of the Forest. This area is approximately 33 square miles. It is a relatively secure piece of habitat, but could be improved slightly (Table 3.10.15).

Table 3.10. 15 Percent secure habitat in the Mile/Sheep Creek area outside of the Grizzly Bear Recovery Zone. Includes all route ownerships, federal, state, county and private.

Mile/Sheep Creek	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7M
Percent Secure	74.6	77.3	77.3	77.7	87.6	87.6	87.7

Alternative 7M has 87.7% secure habitat. Under this alternative, this area is not bisected from the east to west by the motorized Sheep Creek trail. This is an improvement over the current condition.

Absaroka Beartooth

This is the northern part of the Absaroka Beartooth (AB) Mountains, located to the north of the Recovery Zone on the east side of the Gallatin National Forest and south of I-90. This is a large area (478 sq mi) that includes substantial Wilderness acreage. Most of the motorized routes occur in the Mill Creek, East Boulder and Deer Creeks TPAs. The Deer Creeks is not known to be used by grizzly bears at this time, and it has much drier habitat types than most of the Forest. Mill Creek is a heavily motorized area just north of the Recovery Zone. There are some differences among the alternatives for Mill Creek, but it remains heavily motorized under all alternatives (Table 3.10. 16). All road jurisdictions are counted. As in the analysis inside for the areas inside the PCA, project roads are expected to go away over time in Alternatives 2-7. This area does not have many administrative roads.

Table 3.10. 16 Percent secure habitat of the Absaroka Beartooth area outside of the Grizzly Bear Recovery Zone. Includes all road jurisdictions.

North Absaroka/Beartooth	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7M
Percent Secure	73.8	75.8	75.8	80.6	83.5	83.6	78.9

Alternative 7M has 78.9% secure habitat. There is an increase in secure habitat in this area under this alternative over Alternatives 1 and 2 (representing the current condition).

Gallatin/Madison

This is the portion of the Gallatin and Madison Mountain ranges north of the Recovery Zone and south of I-90. In the Madison Range, it includes the Spanish Peaks part of the Lee Metcalf Wilderness Area. These two TPAs are heavily motorized under all alternatives (Table 3.10.17). The Madison (western) part of the area changes little across alternatives. On the Gallatin side, the alternatives that remove motorized use from some or most of the Gallatin Crest allow grizzly bears and other wildlife to have a relatively non-motorized north-south movement corridor. These alternatives also protect some whitebark pine stands from motorized activity. On the Madison side, there is fairly good secure habitat available north of the Recovery Zone. However, movement into this area is likely hampered by the increasing development in the Big Sky area on the east side of

the Madison Range. Grizzly bears may find a safer or easier route to the north on the west side of the Madison Range, which is on the Beaverhead-Deerlodge National Forest.

Table 3.10. 17 Percent secure habitat of the Gallatin/Madison area outside of the Grizzly Bear Recovery Zone. Includes all road jurisdictions.

Gallatin/Madison	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7M
Percent Secure	49.1	52.6	52.6	57.2	59.1	60.2	57.0

Alternative 7M has 57.0% secure habitat. Under this alternative, there are more motorized routes in the Gallatin Roaded and Hyalite TPAs. This is an improvement over the current level of secure habitat (Alternatives 1 and 2) in this area. Most of the decrease appears to be east of the Gallatin Crest.

Summary for Summer Motorized Use

Boulder/Slough subunits #1 and #2 have an extremely high percentage of secure habitat under all seven alternatives. In both subunits, the preferred alternative (7M) has the same or slightly higher secure habitat values than the current condition. This complies with direction in the Grizzly Bear Conservation Strategy (ICST 2003). Since there are no project roads in these subunits, OMARD and TMARD have the same values.

Crandall/Sunlight subunits #1 and 2 have very high secure habitat values. The Gallatin National Forest has only a small proportion of these two subunits. For Crandall/Sunlight #2, there is no difference among the seven alternatives. For Crandall/Sunlight #1, there is a slight difference among alternatives, and Alternative 7M is a slight improvement over the existing condition. Since there are no project roads in this subunit, OMARD and TMARD have the same values.

Only a small portion of the Lamar #1 subunit is on the Gallatin National Forest, however, it includes Cooke City and a fairly highly motorized area to the north of Cooke City. Alternative 7M is very similar to the current condition with an improvement over Alternative 1 and the same amount of secure habitat as Alternative 2. The main difference occurs in the northwest part of the subunit where an area becomes part of the higher route density category. Since there are no project roads in this subunit, OMARD and TMARD have the same values.

Hellroaring/Bear subunits # 1 and #2 lie east of Gardiner in the Absaroka Beartooth Mountains, and Hellroaring Bear #2 consists almost entirely of Wilderness, resulting in a high secure percentage are some project roads affecting these subunits, therefore they have different OMARD and TMARD.. The percent secure does not change from OMARD to TMARD for Hellroaring/Bear #1. Hellroaring/Bear #1 differs only slightly among the alternatives. Alternative 7M has a higher percent secure than Alternatives 1 and 2. Hellroaring/Bear #2 is almost totally within the Absaroka Beartooth Wilderness, and therefore, it is almost totally secure under all alternatives except for some changes in roads in the Passage Creek area of Mill Creek that influence this subunit.

Gallatin #3 is one the subunits designated "in need of improvement" according to the Grizzly Bear Conservation Strategy (ICST 2003). Alternative 7M improves this subunit to 70.2% secure habitat over the current at 54.4% for Alternative 1 and 59.4% for Alternative 2. Because there are project roads, this area improves with all action alternatives. TMARD and OMARD are slightly different, but they both show a decline in route densities in their highest categories from the current condition to Alternative 7M. Alternative 7M is a substantial improvement over the current condition in all categories. The main change is the removal of motorized use from the southern part of the subunit and the reduction in motorized use on the east side of the Gallatin Crest. This creates two fairly large pieces of secure habitat

Hilgard #1 and #2 subunits lie on the west side of the Forest and both contain some of the Lee Metcalf Wilderness. Hilgard #1 secure habitat is 75% and 78.6% under Alternatives 1 and Alternative 2, respectively. Secure habitat is 81.1% under Alternative 7M. TMARD and OMARD differ somewhat. Alternative 7M decreases in the higher motorized route density categories and increases secure habitat for Hilgard #1. Hilgard #2 subunit shows a slight increase in secure habitat from 78.7% and 81.8% in Alternatives 1 and 2, respectively, to 83.1% in Alternative 7M. Road densities also decrease in the higher road density categories.

Madison subunits #1 and #2 are shared with Yellowstone Park, and Madison #2 is one of the subunits that the Grizzly Bear Conservation Strategy designates as "in need of improvement." Madison #1 shows an improvement from Alternative 1 at 75.4% and Alternative 2 at 79.1% secure to Alternative 7M at 83.7% secure. Alternative 7M also shows a decrease in the higher motorized route densities categories in TMARD and OMARD.

Madison #2 shows a small change from Alternative 1 at 66.7% and Alternative 2 with 71.7% to Alternative 7M with 71.8%. Under Alternative 1, project roads remain open, and under all the action alternatives, these roads go away over time. The OMARD and TMARD percentages for road densities are fairly similar. This subunit has almost no secure habitat on the National Forest. There are many private dwellings and attractants in this subunit. It appears there is little potential to increase secure habitat, and this is a subunit where grizzly bears face a higher risk of conflict with humans than in many other subunits (Gunther et al. 2004). Gunther et al. (2004) studied grizzly bear/human conflicts from 1992 to 2000, and found several clusters of conflicts on the Gallatin National Forest. One is in the Madison #2 subunit, another is in the Hilgard subunits (Taylor Fork), and the third is in Gallatin #3 (near Gardiner). In a review of the conflicts and mortalities since 2000 for Madison #2, there continue to be 2-4 conflicts reported each year in this subunit tied to attractants such as garbage and pet or livestock food. There have also been a number of mortalities on both private and public land in the Madison #2 vicinity (ICST Annual Reports 2000-2003). Although all of the action alternatives increase secure habitat, it is in very small pieces surrounded by motorized access routes. The largest piece of secure habitat created is less than about 200 acres. It does not appear to be logical to use scarce resources to improve this subunit given its inherent low habitat value, the attractants available, and mortality risk to bears in this area. In Alternatives 1-6, the Rendezvous Ski Trail routes were accidentally omitted as administrative routes. These routes are maintained infrequently in the summer by motorized vehicles to remove downfall and trim trees growing into the trails. This was corrected for Alternative 7M, and is the same across all alternatives. This means that all action alternatives have 71.8% secure habitat, but Alternatives 1-6 were not re-run.

A small portion (about 15%) of the Plateau #1 subunit lies on the Gallatin National Forest. Most of this subunit is in the Caribou-Targhee National Forest and Yellowstone Park. The portion in the Park is almost entirely secure habitat, and the portion on the Caribou-Targhee has several pieces of secure habitat. The percentages given are somewhat misleading because they are for the entire subunit but omit motorized routes in the Park and on the Caribou-Targhee National Forest. There is no difference among secure habitat percentages under all the action alternatives (Alternatives 2 - 7M). There is a slight improvement over Alternative 1 due to the closure of project roads over time. There is a slight improvement in the higher motorized route densities from Alternative 1 to Alternative 7M.

Henrys Lake #2 subunit is shared between the Gallatin and Caribou-Targhee National Forests, and is one of the subunits designated "in need of improvement" by the Grizzly Bear Conservation Strategy (ICST 2003). Alternative 7M at 62.5% secure is an improvement over both Alternatives 1 and 2 (52.7% and 57.7% secure, respectively), those alternatives closest to the current condition. It improves the subunit over the current level of secure habitat mostly on the west side of the subunit. Alternative 2 shows an improvement over Alternative 1 due to the loss of project roads. This subunit is heavily motorized on the east side. The amount of secure habitat in this subunit is improved thus meeting the direction of the Grizzly Bear Conservation Strategy.

Areas outside of the Grizzly Bear Recovery Zone are not subject to the Grizzly Bear Conservation Strategy access standards at this time, however, if the Forest Plans are amended with the Conservation Strategy for Grizzly Bear, the percent secure in these areas will be monitored and reported on a regular basis. Sheep and Mile Creek are outside of the Recovery Zone in the Henrys Mountains. This area improves from 74.6% under Alternative 1 and 77.3% secure habitat under Alternative 2 to 87.7% secure habitat in Alternative 7M. This is primarily due to the change to non-motorized use for the Sheep Creek Trail.

The Absaroka Beartooth area north of the Recovery Zone and south of I-90 includes substantial Wilderness acreage. Under Alternative 1, secure habitat is 73.8% and under Alternative 2, secure habitat is 75.8%. Secure improves to 78.9% under Alternative 7M.

The Gallatin/Madison areas north of the Recovery Zone and south of I-90 include some of the Lee Metcalf Wilderness. Under Alternative 1 there is 49.1% secure habitat in this area, and it increases under Alternative 2 to 52.6%. Under Alternative 7M, secure habitat increases to 57.0%.

Motorized Winter Use

The Grizzly Bear Conservation Strategy (ICST 2003) has no standards relating to winter use or snowmobiling. However, due to public interest in this issue, it is being addressed here.

Absaroka Beartooth Mountains

The Absaroka Beartooth Mountains include the following TPAs: Beartooth Plateau, Wilderness, Cooke City on the Gallatin National Forest, Deer Creeks, East Boulder, Gardiner Basin, Main Boulder, Mill Creek, Mission and the Custer National Forest portion of the Cooke City area that is administered by the Gallatin National Forest. Total National Forest acres in the AB Mountains are

approximately 825,900 (Table 3.10. 18). There is a slight variation among alternatives in acreage legally closed yearlong to snowmobiling. Across the alternatives, the range is from approximately 607,700 to 637,800 acres. There is no acreage under seasonal closure to snowmobile in this mountain range.

Table 3.10. 18 Yearlong snowmobile closures in the Absaroka Beartooth Mountains, by alternative.

Absaroka Beartooth Mountains TPAs	Acres		Percent Yearlong Snowmobile Closure						
	Gross	Net	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7M
Beartooth Plateau	65,747	65,670	100	100	100	100	100	100	100
Wilderness	518,959	517,975	100	100	100	100	100	100	100
Cooke City (GNF only)	19,405	16,631	0	0	0	23	23	23	0
Deer Creeks	66,937	65,759	0	0	0	0	5	0	0
East Boulder	41,297	39,831	0	0	9	9	9	9	9
Gardiner Basin	25,509	23,286	52	52	55	55	55	55	55
Main Boulder	20,671	16,788	0	0	1	1	3	1	0
Mill Creek	74,552	69,916	15	20	20	20	39	20	26
Mission	11,736.7	10,010	17	17	61	61	61	61	17
TOTAL	844,815	825,866	74	74	75	75	77	75	75

Alternative 7M has 75% of the A/B Mountains legally closed yearlong to snowmobiling. This alternative has slightly more of the East Boulder, Gardiner Basin, Main Boulder and Mill Creek TPAs closed to snowmobiling than Alternative 1, and has significantly more of the Mission TPA closed to snowmobiling. Some of the Custer National Forest part of the Cooke City TPA is closed to snowmobiling under this alternative.

Gallatin Mountain Range

The Gallatin Mountains include the following TPAs: Bear Canyon, Bozeman Creek, Gallatin Crest, Gallatin River Canyon, Gallatin Roaded, Hyalite, Porcupine Buffalo Horn, Sawtooth, Tom Miner Rock, Yankee Jim Canyon, and Yellowstone. Total National Forest acreage in the Gallatin Mountains is approximately 376,794 acres (Table 3.10. 19).

Table 3.10. 19 Yearlong snowmobile closures in the Gallatin Mountains, by alternative.

Gallatin Mountains TPAs	Total Acres		Percent **Yearlong** Snowmobile Closure						
	Gross	Net	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7M
Bear Canyon	20,533	10,716	3	3	0	36	37	36	44
Bozeman Creek	21,583	17,542	85	85	99	100	100	100	100
Gallatin Crest	112,350	106,086	27	27	53	87	94	94	94
Gallatin River Canyon	35,517	29,930	23	23	58	58	60	64	66
Gallatin Roaded	61,123	57,329	2	2	0	2	2	2	2
Hyalite	20,756	20,281	2	2	95	100	100	100	100
Porcupine Buffalo Horn	60,051	53,891	36	36	29	29	68	86	63
Sawtooth	19,616	16,643	1	1	97	97	99	100	99
Tom Miner Rock	24,539	13,331	0	0	55	55	83	62	56
Yankee Jim Canyon	49,587	33,451	60	60	99	99	99	99	99
Yellowstone	30,383	17,595	46	46	5	25	23	23	100
TOTAL	456,038	376,795	27	27	49	61	70	72	72

Table 3.10. 20 Seasonal snowmobile closures in the Gallatin Mountains, by alternative (in addition to yearlong closures).

Gallatin Mountains TPAs	Total Acres		Percent Seasonal Snowmobile Closure						
	Gross	Net	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7M
Bear Canyon	20,533	10,716	0	0	0	0	0	0	0
Bozeman Creek	21,583	17,542	0	0	0	0	0	0	0
Gallatin Crest	112,350	106,086	0	0	0	0	0	0	0
Gallatin River Canyon	35,517	29,930	11	11	10	0	0	0	0
Gallatin Roaded	6,1123	57,329	0	0	0	0	0	0	0
Hyalite	20,756	20,281	0	0	0	0	0	0	0
Porcupine Buffalo Horn	60,051	53,891	27	27	27	0	0	0	0
Sawtooth	19,616	16,643	0	0	0	0	0	0	0
Tom Miner Rock	24,539	13,331	0	0	0	0	0	0	0
Yankee Jim Canyon	49,587	33,451	0	0	0	0	0	0	0
Yellowstone	30,383	17,595	0	0	0	0	0	0	0
TOTAL			5	5	5	0	0	0	0

Alternative 7M has 72% of the Gallatin Range legally closed to snowmobiling yearlong. This alternative is very similar to Alternative 6 but with less of Porcupine Buffalo Horn and Tom Miner Rock closed to snowmobiling but the Yellowstone TPA is completely closed. There are

no areas closed to snowmobiling under this Alternative, and there was 5% of this area closed under the current condition. (Table 3.10.20). The small seasonal closure was absorbed by the larger closures under Alternative 7.

Henrys Mountains

The Henrys Mountains include the following TPAs: Lionhead, South Plateau and Hebgen Lake Basin. Total National Forest acreage in the Henrys Mountains is approximately 143,000 acres (Table 3.10. 21). Only Alternative 5 has any measurable seasonal snowmobile closures.

Table 3.10. 21 Yearlong snowmobile closures in the Henrys Mountains, by alternative.

Henrys Mountains TPAs	Total Acres		Percent Yearlong Snowmobile Closure						
	Gross	Net	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7M
Lionhead	56,965	56,692	44	44	56	61	61	67	53
South Plateau	39,723	39,174	13	13	13	13	14	32	0
Hebgen Lake Basin	57,811	47,059	9	9	9	9	19	21	0
TOTAL	154,499	142,924	24	24	29	31	34	42	21

Table 3.10. 22 Seasonal snowmobile closures in the Henrys Mountains, by alternative (in addition to yearlong closures).

Henrys Mountains TPAs	Total Acres		Percent Seasonal Snowmobile Closure						
	Gross	Net	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7M
Lionhead	56,965	56,692	0	0	0	0	4	0	0
South Plateau	39,723	39,174	0	0	0	0	0	0	0
Hebgen Lake Basin	57,811	47,059	0	0	0	0	2	0	0
TOTAL	154,499	142,924	0	0	0	0	2	0	0

Alternative 7M has 21%, or about 30,000 acres, of the Henrys Mountains legally closed to snowmobiling yearlong. The Lionhead TPA shows an increase in the percentage closed in 7M over what was closed in Alternatives 1 and 2, and the Hebgen lake Basin and South Plateau have no closures in Alternative 7M. There are a few acres of the Hebgen Lake Basin closed seasonally to snowmobiling and none under Alternative 7M (Table 3.10.22).

Madison Mountain Range

The Madison Mountain Range includes the following TPAs: Cabin Creek, Taylor Fork, Cherry Creek, Big Sky and the three Wilderness TPAs (Lee Metcalf Wilderness Hilgards, Monument and

Spanish Peaks). The three Wilderness TPAs are legally closed to snowmobiling under all alternatives (Table 3.10. 23).

Table 3.10. 23 Yearlong snowmobile closures in the Madison Range, by alternative.

Madison Range TPAs	Total Acres		Percent Yearlong Snowmobile Closure						
	Gross	Net	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7M
Cabin Creek	54,735	54,674	2	2	2	2	2	100	2
Taylor Fork	76,960	73,281	20	20	25	25	28	80	65
Cherry Creek	26,684	20,392	0	0	100	100	100	100	100
Big Sky	64,342	17,798	3	3	24	41	41	41	24
LM Wilderness Hilgards	33,344	33,341	100	100	100	100	100	100	100
LM Wilderness Monument	32,347	32,309	100	100	100	100	100	100	100
LM Wilderness Spanish Peaks	68,076	68,074	100	100	100	100	100	100	100
TOTAL	356,489	299,869	5	50	59	60	6	92	69

Table 3.10. 24 Seasonal snowmobile closures in the Madison Range, by alternative (in addition to yearlong closures).

Madison Range TPAs	Total Acres		Percent Seasonal Snowmobile Closure						
	Gross	Net	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7M
Cabin Creek	54,735	54,674	0	0	0	0	98	0	0
Taylor Fork	76,960	73,281	36	60	61	61	57	6	40
Cherry Creek	26,684	20,392	77	77	0	0	0	0	0
Big Sky	64,342	17,798	45	45	45	48	48	48	45
LM Wilderness Hilgards	33,344	33,341	0	0	0	0	0	0	0
LM Wilderness Monument	32,347	32,309	0	0	0	0	0	0	0
LM Wilderness Spanish Peaks	68,076	68,074	0	0	0	0	0	0	0
TOTAL	356,489	299,869	17	23	18	18	35	4	13

Alternative 7M has 69%, or about 206,700 acres, closed to snowmobiling yearlong in the Madison Range. Under this alternative compared to Alternatives 1 and 2, the percentage closed in the Taylor Fork is increased to 65%, in Big Sky to 24% and Cherry Creek is completely closed. This alternative has seasonal closures in 40% of Taylor Fork and 45% of Big Sky. The seasonal closures in Taylor Fork are less than those under the current condition but appear to be absorbed by the yearlong closures there.

Summary of Winter Motorized Effects

In the Absaroka Beartooth, the alternatives range from 74% to 77% closed yearlong to snowmobiles. In the Gallatin the closures under the alternatives range from 27% to 72%, in the Henrys Mountains they range from 21% to 42%, and in the Madison Range they range from 5% to 92% closed.

Areas with seasonal restrictions to snowmobiling in the Gallatin Range range from 0 to 5% closed. There are no seasonal restrictions in the Absaroka Beartooth, but there is already a large percentage closed yearlong. The Henrys Mountains TPA has from 0-2% seasonal restrictions under the alternatives, and the Madison Range has from 4% to 35% seasonal restrictions under the alternatives.

Most action alternatives for these mountain ranges show an increase in areas closed yearlong to snowmobiling except for the Henry's Mountains which shows a slight increase in area open to snowmobiling yearlong. This indicates that grizzly bear denning habitat will be even less affected than it was at the time consultation with the US Fish and Wildlife Service occurred on this subject (2002). In addition, monitoring of grizzly bear dens and snowmachine use will continue. There is still the potential to affect individual bears, particularly sows with cubs-of-the-year, but it is less than it is under current Forest travel management. In monitoring efforts since 2002, no evidence has been found that snowmobiles have disturbed denning or recently emerged grizzly bears. (USDI FS 2004).

Cumulative Effects

Of some concern for Cumulative Effects, but largely beyond human control, is the potential loss of important food sources to grizzly bears. Food sources most in question are whitebark pine and spawning cutthroat trout that are seeing declines due to disease and introduction of lake trout, respectively. Army cutworm moths are another food source, but seem to be relatively constant in the late summer and fall in certain locations where bears have learned to use them. Ungulates, both live and as carrion may vary somewhat in availability with weather conditions, population size, and other factors. Weather conditions also affect availability of food to bears and may affect reproduction and survival. These items are a component of the environmental baseline.

Net Effects of Past and Present Programs and Activities

There are several recurring themes in discussing past and present cumulative effects on grizzly bears. These are activities or situations in the past that have led to grizzly bear/human encounters and/or mortality. These themes are: 1) motorized access routes, 2) availability of food or garbage attractants, and 3) livestock grazing.

Past effects of timber harvest on the Forest in relation to grizzly bear were mostly temporary in nature: loss of hiding cover, change in forage quality and quantity, and the activities related to the timber sale. The longer lasting effect of these projects was the creation and often maintenance of roads used to access and remove timber from the Forest. Motorized access into areas is known to decrease habitat quality for grizzly bears by displacing them from areas near roads. Motorized access also allows more humans into areas where conflicts with grizzly bears may then arise.

Prescribed fire likely has a neutral to beneficial effect for wildlife depending on the area burned. Where prescribed fire is used to reduce fuels in the urban interface, there is probably a neutral impact since unhabituated bears tend to avoid these areas. Fire can result in an increase in succulent forage post-burn. Fire is a natural component of the environment and the natural fire cycle is important for these fire-dependent systems. Fire suppression has resulted in the disruption of the natural fire regime in this area and caused an unnatural buildup of fuels leading to more intense fires. Although an increase in cover provided by fire suppression has some benefits to the bear due to the presence of humans, it may not be the best overall vegetative condition. Restoration of fire into the landscape in some important habitats and fire dependent species is important.

Livestock grazing has been a part of the area that became the Gallatin National Forest since white settlers first arrived in the area. Sheep, goats, cattle, and horses have been grazed on the Forest, and sheep were grazed in large numbers in the 1800's and early 1900's. Grizzly bears seem to have had relatively few interactions with cattle and horses on the Forest, but have definitely run into conflicts on sheep allotments. It is likely that many grizzly bears were killed due to conflicts with livestock, primarily sheep, prior to grizzly bears being protected by law. The reduction in sheep allotments and numbers that has gradually occurred over the years is beneficial in reducing negative interactions between sheep and bears, and grizzly bear mortalities. A very recent development is the closing of the Ash/Iron Mountain sheep allotment, a site of recent grizzly bear conflict.

Weed control is beneficial to grizzly bears and their habitat. Restoration and maintenance of native plant species is important. Efforts to restore whitebark pine and aspen are both important for the grizzly bear. The whitebark pine is a very important food source, and efforts to plant this species post-fire and conduct research on its status in the area are important.

Projects that benefit fisheries and riparian habitat typically also benefit grizzly bears.

Mining has been occurring on the Forest since the time of early settlement. This activity occurred in some areas of high quality habitat, such as Cooke City, and there were undoubtedly conflicts and grizzly bear mortalities as a result. Small mining activities probably have minor impacts on bears, but large operations and also reclamation efforts probably displace bears from some parts of the Forest (such as New World Mine).

Maintaining and improving motorized routes through the Gallatin National Forest is not beneficial for grizzly bears. High speeds can lead to direct grizzly bear mortality on these routes. Maintenance and improvement of roads can increase users of the Forest which can result in increased bear/human encounters. Federal, state and county roads also have the same issues with direct mortality to grizzly bears mentioned before, especially as driving speeds increase. Major routes, such as I-90, can serve as barriers to grizzly bear movement.

The Gallatin National Forest receives a lot of dispersed recreation use with many visits from the public occurring each year. Recreational activities lead to the potential for grizzly bear/human encounters. Encounters with negative consequences seem to be more frequent during the fall hunting season when occasionally grizzly bears are wounded or killed and humans are injured or

killed. Spring bear hunting season has also led to negative grizzly bear/human encounters and loss of grizzly bears through misidentification for black bears.

When humans bring food to the National Forest and are careless with it or with their garbage, the presence of an attractant can also lead to grizzly bear/human encounters. The Grizzly Bear Recovery Zone has had the Food Storage Order in place for over 25 years, which helps to minimize attractant related encounters. A number of human fatalities and injuries and bear mortalities and injuries have resulted from past dispersed use on the Forest.

There are numerous outfitters/guides of various types bringing people to the Forest to recreate for many days. Hunting season is again a time of most negative encounters. Food storage is a part of the outfitter/guide permit and permits are subject to revocation in cases of noncompliance. Many of the outfitted activities, such as rafting, are very unlikely to result in bear/human encounters, but proper food and garbage handling is essential to avoid the presence of food attractants at either over night camps or during day use activities. Winter activities have little potential to affect the grizzly bear except for minor cover removal due to the removal of trees for the trails on several cross-country ski resorts.

Recreation residences are under special use permits and as long as residents follow the food storage order and do not create attractants for bears, they can coexist fairly well with bears.

Most non-recreational special uses are fairly benign once the facility is in place. However, some of these things, such as power lines, come with increased motorized access to the Forest due to service roads for the facilities.

The checkerboard landownership of the National Forest has been problematic for bears. Much of this private land came to be owned by timber companies and led to harvest of accessible acreage. Other land was sold to private developers. The timber harvest itself was not the real problem for grizzly bears, but the road building to access the timber had impacts. Roads and human activity tied to them displace bears from otherwise usable habitat, and also allow humans easier access into areas where grizzly bears occur and resulted in bear mortalities. Lands that are developed into home sites or ski areas result in direct habitat loss and displacement from grizzly bears in these areas. More human access into these areas increases the probability for bear/human encounters resulting in injury or mortality. A significant portion of the checkerboard lands have recently been added back to the National Forest through land acquisitions and adjustments. Recovering this habitat to public ownership has been very beneficial to many wildlife species, including the grizzly bear.

The Food Storage Order on in the Recovery Zone on the Forest has been very beneficial to bears and has undoubtedly decreased bear/human interactions. The implementation of the Food Storage Order and installation of bear resistant garbage containers and food storage boxes has occurred on the Forest and on private lands. This has reduced bear/human encounters. The Grizzly Bear Conservation Strategy (2003) has helped focus grizzly bear conservation efforts.

The presence of large amounts of fairly secure (non-motorized) habitat in Yellowstone National Park is of benefit to the grizzly bear. Creation of designated Wilderness areas also created large

pieces of secure habitat for grizzly bear. Restriction of OHVs use off-road has helped reduce the chance of bear/human encounters and made motorized use predictable to motorized routes.

MFWP sets the hunting and fishing seasons in Montana. Big game season seems to be one of the times of year when grizzly bear mortality occurs due to numerous people being in areas where bears occur and those people are armed. Occasionally grizzly bears are killed through misidentification for black bears. The MFWP has instituted a bear identification course that all black bear hunters must take before they may hunt. In addition, multiple agencies and groups endorse the carrying and use of bear pepper spray in bear encounters. In addition, bear safety is taught by several groups in the state. The MFWP recently complete the State Grizzly Bear Plan for SW Montana.

The reintroduction of the gray wolf into the GYA in 1995 has led to some interactions among grizzly bears and wolves. In recent years, gray wolves have moved onto the National Forest and caused depredation on some cattle and sheep allotments. In some cases, it is unclear which species (bears or wolves) caused the depredation, and which species just took advantage of the situation.

The Canada lynx was listed as threatened under the ESA in 2000. The Forest has been using guidance in the Lynx Conservation Assessment and Strategy in analysis and to guide decisions, primarily related to winter use (Reudiger et al. 2000).

The combination of the effects of the above activities along with protection of the grizzly bear under the Endangered Species Act has overall been positive for the bear. Some activities or effects have been negative, such as the history of motorized access route building and management. Some have been very positive, such as the acquisition of private checkerboard lands, implementation of the Food Storage Order and decline of sheep grazing on the Forest. On the whole, the resulting effects have been positive. The grizzly bear population in the GYA has met or exceeded recovery criteria.

The following information is on the effects of routes and land not under Forest Service jurisdiction.

The Boulder #1 subunit is almost entirely Wilderness. However, this subunit contains the private land in the Main Boulder corridor as well as the non-Forest Service road leading up the Main Boulder. This subunit offers large secure acreage for grizzly bears.

Boulder #2 lies on the Forest and in Yellowstone Park. The only motorized route in the subunit is the non-Forest Service road in the Park. This subunit also offers large secure habitat for grizzly bears.

The Crandall/Sunlight #1 subunit contains a piece of Highway 212 and has private routes associated with private land near Colter Pass. When combined with Forest Service routes, the northwest edge of this subunit is fairly motorized with an area of highest road density around the private land.

Crandall/Sunlight #2 has only a minute portion on the Gallatin National Forest. This small piece is affected by Highway 212 and only has a small portion non-motorized. The numbers in Table 24 are percentages for the entire subunit, not just the Gallatin National Forest. This subunit lies almost entirely on the Shoshone National Forest.

Lamar #1 is the subunit that includes Cooke City and is bisected by Highway 212. The road density along Highway 212 and the private land area is very high due to the state highway and private routes. Miller Creek road is a county road. When combined with the Forest routes, the portion of this subunit on the National Forest is fairly heavily motorized and has very little secure habitat. A small piece of this subunit lies on the Shoshone National Forest while most of this subunit lies within Yellowstone National Park.

Hellroaring #1 subunit has Highway 89 on the west side with numerous small pieces of private land and high motorized route density all along this highway corridor. The town of Gardiner is within the subunit. The main road to Jardine and then to the southeast is not a Forest Service road. A fairly large piece of this subunit is in the AB Wilderness, with a small portion in the Park, and these are non-motorized areas. When non-Forest Service routes are added to Forest Service routes, almost the entire Bear Creek/Eagle Creek area has high route densities.

Hellroaring #2 subunit is largely in the AB Wilderness on the Forest and partially in the Park. The only private land and route affecting this subunit is the small route up Passage Creek at the north side of the subunit.

Gallatin #3 has many non-Forest Service routes, especially on the east side (Cinnabar and Mulherin drainages), and state highways on the east and west sides (Highway 191 and 89). Tom Miner and other areas on the northeast side of the subunit also have private land and motorized routes. With all motorized routes, including Forest Service routes, the subunit is most heavily impacted on the east side and has numerous routes on the west side with some pieces of secure habitat. The small portion of the subunit in the Park is non-motorized.

Hilgard #1 and #2 include Highway 191 and the Taylor Fork Road. There are some private land parcels and accompanying routes in Hilgard #1 and #2. Hilgard #1 includes a piece on the Beaverhead-Deerlodge National Forest that is all Wilderness and has some minor route density along the western boundary. Hilgard #2 includes the Monument Mountain piece of the Lee Metcalf Wilderness and a small piece of Yellowstone Park. These are non-motorized except for a piece of Highway 191 in the Park. This yields large pieces of secure habitat in both subunits with some smaller pieces of secure habitat as well.

Madison #1 includes parts of Highways 191 and 287. In addition, there is a large piece of private land near the junction of these two routes, a smaller private piece at Red Canyon, and some private land along the north lake shore that are fairly heavily motorized. The portion of the subunit that lies in Yellowstone Park is non-motorized except for Highway 191. In conjunction with Forest Service routes, this gives some secure habitat primarily in the Cabin Creek area and in the Park.

Madison #2 includes the town of West Yellowstone and several private subdivisions that have high motorized route densities. The most noticeable of these are the Horse Butte area and a piece along the South Fork of the Madison River. This subunit also includes Highways 20 and 191, and a county road leading to Horse Butte. In conjunction with Forest Service routes, this cumulatively gives the portion of the Madison #2 subunit lying on the Gallatin National Forest a very high motorized route density. Fortunately, the National Park part of this subunit is almost entirely non-motorized except for the road leading into the Park from West Yellowstone.

Plateau #1 has few cumulative effects from private, state or county routes in the subunit on the Gallatin National Forest. The subunit portion in the Park is virtually entirely non-motorized but has

some route density near the boundary due to buffering routes on the Forest. On the Caribou-Targhee Forest in the southwest part of the bear subunit, there are fairly high route densities on the western part of the subunit and along the Park boundary, but it also has three sizeable pieces of secure habitat.

Henrys Lake #2 is bisected by Highway 20 from east to west. There is high route density in the private land located on the east side of the subunit, mostly north of Highway 20 and west of the South Fork of the Madison River. This area consists of over 3,000 acres of private land. There is also high route density on the private land in the area just north of Spring Creek on the western shore of Hebgen Lake. When added to the road densities on the National Forest and Forest Service routes, this makes almost continuous areas of high motorized route density on the part of this subunit that lies on the Gallatin National Forest. The Caribou-Targhee National Forest portion of this subunit is bisected by Highway 20 and a Forest Service road, Twin Creek. The Caribou-Targhee Forest has three sizeable pieces of secure habitat.

The Absaroka Beartooth Range outside of the Recovery Zone has some effects from non-Forest Service routes. On the Big Timber Ranger District, these areas are mostly in the Main Boulder, East Boulder, some private inholdings on the north edge of the Forest near the West Boulder, Mill Fork and Mission Creek. On the Livingston Ranger District, they are in Mill Creek and Emigrant Gulch areas. The effects of these routes are compounded by the addition of Forest Service routes, especially in the Mill Creek and Main Boulder drainages.

The Madison and Gallatin Range portions outside of the Recovery Zone have quite a few more areas of private inholdings and associated routes, as well as the development up and down the Gallatin Canyon and Big Sky in the Madison Range. There is some checkerboard ownership on the east side of the Gallatin Range in the Fridley and Miller Creek areas, with numerous motorized routes. State Highway 191 goes through the Gallatin Canyon, and the Big Sky area is heavily developed with many motorized routes.

The Mile/Sheep Creek area is located outside of the Recovery Zone. This piece is relatively unaffected by non-Forest Service routes.

It is likely that the number of motorized routes adjacent to the National Forest and accessing private land within the Forest boundaries will continue to increase. Existing state, county and federal routes such as I-90 are unlikely to change very much in the future, and there probably will not be many more of these routes constructed, but existing routes may be widened or otherwise altered. Motorized routes within 500 m of the National Forest boundary affect bears on the National Forest according to the Moving Windows Analysis with the 500-m buffer. Grizzly bears that use this area do venture onto private, state and county lands near the Forest. Where speed limits are higher, bears are more likely to be hit by motor vehicles when they try to cross these routes. There have been some grizzly bear mortalities on highways that pass through the Forest.

Projected Combined Effects of Reasonably Foreseeable Programs and Activities

There are several recurring themes in discussing reasonably foreseeable cumulative effects on grizzly bears. These are activities or situations in the past that have led to grizzly bear/human conflict and/or mortality. These themes are: 1) motorized access routes, 2) availability of food or

garbage attractants, and 3) livestock grazing. An improving trend in all three of these factors is occurring, and is expected to continue to occur.

Future projects involving timber removal may tend to be tied largely to fuels reduction and management and will tend to be partial cuts. The major effect of timber activities on grizzly bears, that of new motorized routes, will be limited to temporary and low grade routes, if any new routes are needed, and all project routes are to be closed and/or obliterated after the project is completed.

Efforts are being made to increase the number of acres treated annually with prescribed fire. These projects will be coordinated and planned with wildlife in mind, and should overall be beneficial or neutral for the grizzly bear. Fire is a natural component of the landscape, and returning the Forest to a normal fire regime is beneficial for many wildlife species.

More efforts to maintain native species of vegetation on grazing allotments and protect riparian areas are occurring through the range management program. These efforts are beneficial to all wildlife species, including grizzly bears. Depredation from grizzly bears should decrease with the loss of sheep allotments on the Forest.

Expanded efforts to control weeds on the Forest are occurring. This will have an overall positive effect for wildlife species. Continuing the whitebark pine and aspen efforts at some level would be beneficial to the grizzly bear.

Future fisheries habitat enhancement will be of benefit to the grizzly bear, especially when riparian areas are improved.

Future minerals activity on the Forest is an issue due to the presence of the grizzly bear. Of particular concern is the exploration for leasable minerals. This can lead to an increase motorized activities such as helicopters and motorized access routes. Direction from the Grizzly Bear Conservation Strategy does not allow new motorized routes or developed sites within the Recovery Zone without compensation within the same subunit. At this time, most of the interest in leasable minerals appears to be in the Crazies and Bridger Mountains which are currently well outside areas currently inhabited by grizzly bears. There is the potential for new mineral claims within grizzly bear habitat and the activity that accompanies them. These activities must be mitigated.

According to the travel plan and following direction from the Grizzly Bear Conservation Strategy, there will be no new developed sites on the National Forest in the grizzly bear Recovery Zone, and there will be no decrease in secure habitat in the Recovery Zone and an increase in secure habitat in some subunits. Road and trail maintenance will continue at the levels stated in the travel plan. Implementation of any of the travel plan action alternatives is an improvement over the current secure habitat situation for grizzly bears given the closure of project roads and designation of routes.

From a dispersed recreation perspective, the types of activities that lead to grizzly bear/human encounters on the Forest seem to show an increase indicating greater future use by day hikers, backpackers, and wildlife watchers among others. With a concurrent increase in the numbers of grizzly bears and an increase in the area utilized by bears, we can expect an increase in bear/human

encounters. The Food Storage Order is planned to be expanded Forest-wide in 2007. This should help modify bear/human encounters related to attractants. In addition, both MFWP and the FS as well as other entities, are encouraging the public to carry bear pepper spray when recreating on the National Forest. In the future, this should help to defuse some bear/human encounters. Educational programs on bear identification and safety are continuing and improving. No matter how much or how hard we work to prevent it, as long as humans and grizzly bears occupy the same landscape, there are likely to be bear/human encounters. We can strive to decrease the negative outcomes of these encounters, and steps are being taken to do so.

Outfitting/guiding is likely to increase with demand on the Forest. Outfitters/guides assuring that their group follows the rules are probably less likely to have bear/human encounters than the general public.

There is no plan to increase recreation residences on the Forest. Permits for most of these facilities are being renewed in 2008. Language is being added to all permits on proper storage of food and garbage and consequences for noncompliance. Language is also being added to assure that any user of the residences is responsible, not just the permit holder.

Requests for special uses permits for non-recreational uses will continue. The main concern would be during the construction phases of the projects and then afterward if any motorized access routes are created. All of these requests will go through site-specific NEPA. Motorized access routes must be minimized or avoided in the Grizzly Bear Recovery Zone and where bears occur on the Forest.

The Forest will continue to acquire appropriate lands and conservation easements that will have an overall beneficial effect for wildlife, including grizzly bears.

The expansion of the Food Storage Order Forest-wide will be beneficial for bears and other wildlife. It will keep wild animals from becoming habituated to human food and losing their innate fear of humans. It should also reduce the potential for bear/human encounters. The future amendment of the Conservation Strategy for Grizzly Bear to the Forest Plans in the GYA will help assure the conservation of this species.

As the grizzly bear population increases, and human population and traffic in the area increases, the potential for grizzly bear mortality on highways increases. Increased driving speeds and poor sight distances contribute to mortality. Working with the highway departments on wildlife passage, including grizzly bears, is important.

The Gallatin National Forest's travel management plan is likely to reduce motorized routes on the Forest and thus increase secure habitat for grizzly bears and reduce motorized route densities. Other Forests are also undergoing travel management planning, either by district or Forest. The trends are likely to be similar to those of the Gallatin within the Recovery Zone.

The bison capture facility is likely to continue to exist at Horse Butte and one may be built north of the Park on the National Forest. The same situation is likely to continue at Horse Butte, and any

new facility on the Forest will have to go through site-specific NEPA and will include an effects analysis for grizzly bears.

Hunting seasons will continue, and due to the presence of hunters with guns and grizzly bears in close proximity, human/bear encounters are likely to continue to occur. Education and enforcement of food storage may help to reduce the likelihood that these will be fatal encounters. Food Storage efforts must be maintained and increased as the human population increases and the bear population expands. The expansion of the Food Storage Order is one item that will occur in 2007.

The combination of wolves and grizzly bears in livestock depredation scenarios is not a good one. At this time, it appears that wolves are exerting a significant influence on some cattle allotments in terms of distribution of animals, etc. Grizzly bears have not been involved in cattle depredations in the past, but it is uncertain what the future holds. Because sheep have gradually phased out of the allotments on the Forest, that issue of depredation has been resolved.

The Grizzly Bear Conservation Strategy Amendment to the Forest Plans in the GYA gives a detailed look at the effects of reasonably foreseeable activity on the grizzly bear on a GYA-wide basis. For additional information, please see this DEIS or FEIS when that becomes available. Using the Lynx Conservation Assessment and Strategy (Reudiger et al. 2000) guidance generally benefits grizzly bear by addressing effects of motorized use on habitat.

Cumulative Effects of Past, Present and Reasonably Foreseeable Programs and Activities with the Travel Plan Alternative 7M

This table (Table 3.10.25) summarizes the effects of Travel Plan alternatives by presenting the percentage of secure habitat across the alternatives by grizzly bear subunit or area outside of the Recovery Zone south of I-90 where grizzly bears may occur. More detail is available in the body of this issue on effects by subunit.

Table 3.10.25. Table of secure habitat percentages by subunit and area outside of the Recovery Zone across Travel Plan alternatives.

Subunits and areas outside Recovery Zone	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7M
Boulder Slouth #1 Percent Secure	96.3	96.4	96.4	96.4	96.7	96.7	96.6
Boulder Slough #2 Percent Secure	100	100	100	100	100	100	100
Crandall/Sunlight #1 Percent Secure	96.0	96.3	96.1	96.1	96.7	96.7	96.3
Crandall/Sunlight #2 Percent Secure	99.7	99.7	99.7	99.7	99.7	99.7	99.7
Lamar #1 Percent Secure	93.9	94.5	94.4	94.4	95.2	95.1	94.5
Hellroaring/Bear #1 Percent Secure	75.1	79.5	81.3	81.3	81.3	81.3	80.4
Hellroaring/Bear #2 Percent Secure	98.1	98.5	98.5	99.0	99.0	99.0	99.7
Gallatin #3 Percent Secure	54.4	59.4	60.1	62.2	71.8	81.0	70.2
Hilgard #1 Percent Secure	75.0	78.6	78.6	81.1	81.7	89.2	81.1
Hilgard #2 Percent Secure	78.7	81.8	81.8	81.3	82.9	90.2	83.1
Madison #1 Percent Secure	75.4	79.1	82.2	83.2	83.4	89.6	83.7
Madison #2 Percent Secure	66.7	71.7	71.7	71.7	71.7	71.7	71.8
Plateau #1 Percent Secure	92.1	93.8	93.8	93.8	93.8	93.8	93.8
Henrys Lake #2 Percent Secure	52.7	57.7	57.7	58.8	64.5	67.5	62.5
Mile/Sheep Creek Percent Secure	74.6	77.3	77.3	77.7	87.6	87.6	87.7
North Absaroka/Beartooth Percent Secure	73.8	75.8	75.8	80.6	83.5	83.6	78.9
Gallatin/Madison Percent Secure	49.1	52.6	52.6	57.2	59.1	60.2	57.0

Private, state, county and other non-Forest Service motorized routes affect grizzly bears the same way that motorized Forest Service routes affect bears, and many times, the speed limits are higher and surfaces are different. There are some areas with very high amounts of non-Forest Service routes.

Effects common to all Alternatives

Boulder/Slough subunits #1 and #2 have an extremely high percentage of secure habitat under all seven alternatives (Table 3.10.25). In both subunits, the preferred alternative (7M) has the same or slightly higher secure habitat values than the current condition. This complies with direction in the Grizzly Bear Conservation Strategy (ICST 2003). Since there are no project roads in these subunits, OMARD and TMARD have the same values.

Crandall/Sunlight subunits #1 and 2 have very high secure habitat values (Table 3.10.25). The Gallatin National Forest has only a small proportion of these two subunits. For Crandall/Sunlight #2, there is no difference among the seven alternatives. For Crandall/Sunlight #1, there is a slight difference among alternatives, and it appears that Alternative 7M is a slight improvement over the existing condition. Since there are no project roads in this subunit, OMARD and TMARD have the same values.

Hellroaring/Bear subunits # 1 and #2 lie east of Gardiner in the Absaroka Beartooth Mountains, and Hellroaring Bear #2 consists almost entirely of Wilderness, resulting in a high secure percentage are some project roads affecting these subunits, therefore they have different OMARD and TMARD. The percent secure does not change from OMARD to TMARD for Hellroaring/Bear #1 (Table 3.10.25). Hellroaring/Bear #1 differs only slightly among the alternatives. Alternative 7M has a higher percent secure than Alternatives 1 and 2. Hellroaring/Bear #2 is almost totally within the Absaroka Beartooth Wilderness, and therefore, it is almost totally secure under all alternatives except for some changes in roads in the Passage Creek area of Mill Creek that influence this subunit.

Madison #2 has OMARD and TMARD percentages for road densities that are fairly similar (Table 3.10.25). This subunit has almost no secure habitat on the National Forest. There are many private dwellings and attractants in this subunit. It appears there is little potential to increase secure habitat, and this is a subunit where grizzly bears face a higher risk of conflict with humans than in many other subunits (Gunther et al. 2004). Gunther et al. (2004) studied grizzly bear/human conflicts from 1992 to 2000, and found several clusters of conflicts on the Gallatin National Forest. One is in the Madison #2 subunit, another is in the Hilgard subunits (Taylor Fork), and the third is in Gallatin #3 (near Gardiner). In a review of the conflicts and mortalities since 2000 for Madison #2, there continue to be 2-4 conflicts reported each year in this subunit tied to attractants such as garbage and pet or livestock food. There have also been a number of mortalities on both private and public land in the Madison #2 vicinity (ICST Annual Reports 2000-2003). Although all of the action alternatives increase secure habitat, it is in very small pieces surrounded by motorized access routes. The largest piece of secure habitat created is less than about 200 acres. It does not appear to be logical to use scarce resources to improve this subunit given its inherent low habitat value, the attractants available and mortality risk to bears in this area. In Alternatives 1-6, the Rendezvous Ski Trail routes were accidentally omitted as administrative routes. These routes are maintained infrequently in the summer by motorized vehicles to remove downfall and trim trees growing into the trails. This was corrected for Alternative 7M, and is the same across all alternatives. This means that all action alternatives have 71.8% secure habitat, but Alternatives 1-6 were not re-run.

A small portion (about 15%) of the Plateau #1 subunit lies on the Gallatin National Forest. Most of this subunit is in the Caribou-Targhee National Forest and Yellowstone Park. The portion in the Park is almost entirely secure habitat, and the portion on the Caribou-Targhee has several pieces of

secure habitat. The percentages given are somewhat misleading because they are for the entire subunit but omit motorized routes in the Park and on the Caribou-Targhee National Forest. There is no difference between secure habitat percentages under all the action alternatives (Alternatives 2 - 7M) indicating that there are not a lot of options to improve this area (Table 3.10.25).

Henrys Lake #2 subunit is shared between the Gallatin and Caribou-Targhee National Forests, and is one of the subunits designated "in need of improvement" by the Grizzly Bear Conservation Strategy (ICST 2003). This subunit is heavily motorized on the east side.

Alternative 7M lies somewhere in between Alternatives 3-4 and 5-6 (Table 3.10.25). In all cases 7M is at least equal to if not an improvement over Alternatives 1 and 2 for secure habitat and road densities. This alternative would include new programmatic direction and would include the direction provided in the Grizzly Bear Conservation Strategy (2003) according to the MOU (2003) stating that the Forests should implement the Strategy as well and the FWS BO (1996) that directed the Gallatin National Forest to adopt GYA access standards when they became available. This Alternative includes the programmatic direction in the Travel Plan. This alterative would also designate routes. In almost all subunits, the impacts of Alternative 7M are in between those of Alternatives 3 and 4 and those of Alternatives 5 and 6. Thus secure habitat is higher than Alternatives 3 and 4 and route densities are lower than in 7M. Secure habitat is lower than in Alternatives 5 and 6 and the route densities are higher than in 7M. This alternative is compatible with grizzly bears and recovery, and has met the Conservation Strategy (2003) standard of increasing secure habitat and decreasing route densities in the 3 subunits in need of improvement on the Forest (Gallatin #3, Madison #2, and Henry's Lake #2) as well as maintaining or improving secure habitat percentages in other subunits and maintaining or improving route densities. This Alternative has met the intent of the Conservation Strategy.

For Gallatin #3, one of the "subunits in need of improvement", Alternative 7M is a substantial improvement over the current condition in all categories (Table 3.10.25). The main change is the removal of motorized use from the southern part of the subunit and the reduction in motorized use on the east side of the Gallatin Crest. This creates two fairly large pieces of secure habitat. Gallatin #3 is one the subunits designated "in need of improvement" according to the Grizzly Bear Conservation Strategy (ICST 2003). Alternative 7M improves this subunit to 70.2% secure habitat over the current at 54.4% for Alternative 1 and 59.4% for Alternative 2. Because there are project roads, this area improves with the implementation of Alternative 2. TMARD and OMARD are slightly different, but they both show a decline in route densities in their highest categories from the current condition to Alternative 7M.

Only a small portion of the Lamar #1 subunit is on the Gallatin National Forest, however, it includes Cooke City and a fairly highly motorized area to the north of Cooke City. Alternative 7M is very similar to the current condition with an improvement over Alternative 1 and the same amount of secure habitat as Alternative 2 (Table 3.10.25). The main difference occurs in the northwest part of the subunit where an area becomes part of the higher route density category. Since there are no project roads in this subunit, OMARD and TMARD have the same values.

Hilgard #1 and #2 subunits lie on the west side of the Forest and both contain some of the Lee Metcalf Wilderness. Hilgard #1 secure habitat is 81.1% under Alternative 7M (Table 3.10.25).

TMARD and OMARD differ somewhat. Alternative 7M decreases in the higher motorized route density categories and increases secure habitat. Hilgard # 2 is 83.1% secure in Alternative 7M. Road densities also decrease in the higher road density categories.

Madison subunits #1 and #2 are shared with Yellowstone National Park, and Madison #2 is one of the subunits that the Grizzly Bear Conservation Strategy designates as "in need of improvement." For Madison #1, Alternative 7M also shows a decrease in the higher motorized route densities categories in TMARD and OMARD (Table 3.10.xx). Madison #2 shows Alternative 7M with 71.8% secure which is the same as most action alternatives showing that there is little option for improvement.

Plateau #1 shows a slight improvement in the higher motorized route densities from Alternative 1 to Alternative 7M (Table 3.10.25).

Henrys Lake #2 subunit Alternative 7M at 62.5% secure is an improvement over both Alternatives 1 and 2 (52.7% and 57.7% secure, respectively), those alternatives closest to the current condition (Table 3.10.25). It improves the subunit over the current level of secure habitat mostly on the west side of the subunit.

Sheep and Mile Creek are outside of the Recovery Zone in the Henrys Mountains. This area improves to 87.7% secure habitat in Alternative 7M (Table 3.10.25). This is primarily due to the change to non-motorized use for the Sheep Creek Trail. The Absaroka Beartooth area north of the Recovery Zone and south of I-90 includes substantial Wilderness acreage. Secure improves to 78.9% under Alternative 7M. The Gallatin/Madison areas north of the Recovery Zone and south of I-90 include some of the Lee Metcalf Wilderness. Under Alternative 1 there is 49.1% secure habitat in this area, and it increases under Alternative 2 to 52.6%. Under Alternative 7M, secure habitat increases to 57.0%.

For yearlong snowmobiling, the percentage of the mountain ranges open to snowmobiling south of I-90 by Mountain range is decreased for all mountain ranges except the Henry Mountains where the percentage is increased slightly in Alternative 7M. The A/B sees little change across the alternatives and the Gallatin Range and Madison Range see a fairly large shift by an increase in acres closed to snowmobiles in Alternative 7M. Additional seasonal closures are insignificant. Although the issue of grizzly bear denning and emerging and snowmobile impacts has not been substantiated in this area, additional acreage closed to snowmobiling means that grizzly bear denning habitat is more protected from potential disturbance.

Cumulatively, management actions on the Gallatin National Forest generally improve conditions for the grizzly bear over the current condition. There are large pieces of secure habitat found in the National Parks and Forests in the Yellowstone area. The action alternatives of this travel plan, especially 5, 6 and 7M provide increased habitat security for grizzly bears. Most impacts to grizzly bears are from cumulative effects on private lands, and are not from the actions of the Forest Service or other agencies. Alternative 7M follows current direction from the Grizzly Bear Conservation Strategy (2003) and incorporates access related direction into the travel plan which is beneficial for grizzly bears. The potential future Grizzly Bear Conservation Strategy Amendment to the Forest Plans also offers protection of grizzly bear habitat.

Determination of Effect

Types of travel considered in this analysis are summer and winter travel by motorized and non-motorized means. Human access into grizzly bear habitat, no matter the means, can affect grizzly bears. The overall and long-term effects of implementation of a Travel Plan, and an Alternative like 7M, or one that increases secure habitat and decreases motorized routes from the present, is less impactive on grizzly bears, and is likely to be beneficial to bears in the long-term. Alternative 7M reduces motorized routes in many locations on the Forest, does not increase motorized access route densities in any bear subunit, and makes improvements in the three subunits on the Gallatin National Forest "in need of improvement" (Gallatin #3, Madison #2, and Henry's Lake #2) according to the Conservation Strategy (2003) . Alternative 7M also reduces the amount of acreage open to snowmobiling, thus protecting more potential denning habitat for grizzly bears. The 2002 Biological Assessment on the effects of snowmobiles on grizzly bears in on five National Forests in the Yellowstone area determined that snowmobiles had the potential to affect grizzly bears, especially sows with cubs-of-the-year. Although such effects have not been found after monitoring of dens and emerging bears in the spring, the potential to affect grizzly bears still exists. The 2004 Biological Assessment on the Gallatin National Forest on Bears outside of the Recovery Zone also made a "may affect, likely to adversely affect" determination. This was because human use allowed by the National Forest may impact individual grizzly bears, especially those uses related to motorized access, food storage, and livestock. The grizzly bear in the Yellowstone Area has met recovery criteria. It is likely that this species will be removed from protection of the Endangered Species Act in the future. Although this Travel Plan will be a large improvement for grizzly bears over the baseline condition for motorized access on the Gallatin National Forest in reducing motorized route densities in many areas, and there are large completely non-motorized areas, there are also some areas of relatively high motorized route density, thus the effect of travel management on the grizzly bear is "may affect, likely to adversely affect."

Coordination Measures

Motorized access route density analyses hinge on the statement that project roads will go out of use over time. Some of these are already impassible. Monitoring these routes to assure that they are not being used by wheeled motorized vehicles is important to assure that they truly do not affect the grizzly bear. Monitoring of project road use, and taking action to close project routes that are being used by summer motorized vehicles is essential to assure that grizzly bear effects are those displayed in this analysis.

Monitoring administrative routes to assure that they are gated to the public and use is carefully permitted is also important for this effects analysis. Assuring that these routes are gated, and that use is limited to Forest employees, permittees or contractors is essential.

Continue monitoring spring snowmobile use and known den sites to assure that if conflict among snowmobile use and grizzly bears occur that the agency can take appropriate action.

Enforcement of the travel plan is important and should be monitored to assure that if illegal use is occurring on undesignated routes that appropriate management actions are taken.

The Travel Plan should be the new baseline for secure habitat percentages for the bear management subunits and parts of the Gallatin National Forest south of I-90 where bears occur.

The Biological Opinion on this Travel Plan should supercede direction from all previous access or travel management related BOs.

Expected Future status of the Yellowstone Grizzly Bear

The grizzly bear in the Yellowstone Area has met the recovery criteria in the Recovery Plan. The population has risen from approximately 200 or so 25 years ago to approximately 500 today. Grizzly bears are expanded their range and being seen in places they have not been seen for many years. The population is at the beginning of the delisting process, however, litigation is very likely to slow the process. Many protections are in place on public lands and efforts are being made on private land in the Yellowstone Area. This population should continue to reach recovery criteria in the future, and should be delisted in the next few years.

CANADA LYNX

INTRODUCTION

The Canada lynx was listed as a threatened species under the Endangered Species Act in March 2000. Lynx have been documented, historically and currently, throughout the Rocky Mountains of Montana from the Canadian border through the Yellowstone area. Lynx generally occur in moist subalpine fir habitats, above the dry ponderosa pine and Douglas fir habitat types, and below the alpine zones. Primary lynx habitat in Montana east of the Continental Divide consists of subalpine fir forests as the primary vegetation, intermixed Engelmann spruce and lodgepole pine. On the east side of the Continental Divide, elevation ranges of subalpine fir forests range from 5,500 to 8,000 feet (Ruediger et al. 2000, Claar et al. 1999). The effects to lynx has been identified as an issue as it relates to the existing transportation plan and proposed Travel Plan alternatives. Research suggests that the presence of roads can negatively affect lynx and lynx habitat, directly and indirectly.

Lynx are a prey specialist, largely dependent on snowshoe hares, and usually occur in the habitats where snowshoe hares are most abundant (Claar et al. 1999). Lynx are specially adapted to survival in deep soft snow regions, such as the higher elevations in the northern Rocky Mountains. Physical adaptations to deep snow give lynx a competitive advantage over other predators, which includes the coyote, bobcat, and cougar. Outside of deep snow areas, these generalist predators are believed to exclude lynx through effective competition for food resources. There is a concern that compacted snow routes allow these other predators access up into areas that are normally the exclusive winter range of the lynx.

Directions for evaluating federal actions relative to lynx habitat are provided in the Canada Lynx Conservation Assessment and Strategy (LCAS) (Ruediger et al. 2000). A Forest-wide lynx habitat analysis conducted in 2000 designated Lynx Analysis Units (LAUs), which are intended to provide the appropriate scale to begin evaluation of the effects of management actions on lynx habitat. The

configuration of LAUs was modified in 2005 based on recommendations from the Lynx Biology Team (Claar and others 2005).

STATUS, HABITAT USE, AND BEHAVIOR

Lynx habitat can be generally described as boreal forests that have cold winters with deep snow and that provide a snowshoe hare prey base (USDI 2003). Most lynx occurrences in the western United States are associated with Rocky Mountain conifer forest. On the Gallatin National Forest, this elevation range is between 6,000 and 8,800 feet. Primary vegetation that contributes to lynx habitat is lodgepole pine, subalpine fir and Engelmann spruce. Secondary vegetation, that when interspersed within subalpine forests may also contribute to lynx habitat, includes cool, moist Douglas fir and aspen forests. Dry forest types (e.g., ponderosa pine, climax lodgepole pine) do not provide lynx habitat. According to the U.S. Fish and Wildlife Service (FWS) (USDI 2003), lynx populations are sustained by cyclic influx from lynx populations in Canada.

Lynx need mature forest with a dense understory cover from large woody debris and saplings for denning (Claar et al. 1999). Mature conifer forest with thick deadfall provides denning sites, security, and thermal cover for kittens. The integral component for all lynx den sites appears to be the amount of downed, woody debris present, not the age of the forest stand (USDI 2003). Early successional forests are required for hunting (Koehler and Brittell 1990) although denning habitat with dead and down material and structural layers composed of seedlings and saplings also provide foraging habitat. In general, habitats that favor snowshoe hare will provide optimal foraging habitat. Generally, earlier successional forest stages have greater understory structure than do mature forests and, therefore, support higher hare densities (USDI 2003).

Snowshoe hares are the primary prey of lynx and lynx distribution is nearly the same as that of snowshoe hare (USDI 2003). Lynx diets as determined from a study in north central Washington consisted of 79% snowshoe hares and 24% red squirrels (Koehler 1988). Preferred lynx foraging habitat consists of dense conifer seedling and sapling stands that provide snowshoe hare browse and escape and thermal cover (Koehler 1990). Most research has focused on the winter diet, and diets in the summer are poorly understood throughout the range. However, indications are that the summer diet may include a greater diversity of prey species. Lynx are able to subsist on jackrabbits and other mid-sized prey in foothills and drier montane environments where competition from bobcats is not overbearing. During the cycle when hares become scarce, the proportion and importance of other prey species, especially red squirrel, increases in the diet. However, Koehler (1990) suggested that a diet of red squirrels alone might not be adequate to ensure lynx reproduction and survival of kittens. A shift to alternate food sources may not sufficiently compensate for the decrease in hares consumed to be adequate for lynx reproduction and kitten survival (USDI 2003).

As a solitary, wide-ranging predator, lynx maintain low population densities and are vulnerable to cyclic prey densities. Koehler (1988) and the US Fish and Wildlife Service (USDI 2003) suggest that the scarcity of prey (naturally lower densities of snowshoe hare), may account for the low density and low productivity of lynx in the southern part of lynx range. Similarly, home range size varies with dispersion pattern of suitable habitat and with the abundance of prey as a response to lower density snowshoe hare populations. Males generally maintain larger home ranges than females. In Montana, Brainerd (1985) reports home range sizes of about 17 and 122 sq mi for

females and males respectively. Nellis (1989) indicates that most home ranges fell between 5 to 20 sq mi. Ruediger et al. (2000) found annual home range size for females averaged 44 sq mi.

The US Fish and Wildlife Service (USDI 2003) describes a scenario wherein lynx range coincides with that of the southern margins of boreal forest where it is naturally fragmented into patches of varying size as it transitions into subalpine forest. Where boreal forest patches within the contiguous United States are large, with suitable habitat, prey, and snow conditions, resident populations of lynx are able to survive throughout the cyclic snowshoe hare populations. When there is a high in the lynx metapopulation in Canada, dispersion of individuals act like a wave radiating out to the margins of the lynx range. Lynx are able to disperse long distances, crossing unsuitable habitats, in order to colonize suitable habitats and find potential mates.

The US Fish and Wildlife Service partially bases their conclusions regarding whether lynx in a particular area are resident or dispersers on the record of reliable reports of lynx, of which the best information available on historic lynx presence is trapping data. McKelvey et al. (1999) looked at the historical distribution of lynx from the 1880s to the present. They found evidence of lynx from museum specimens collected in 1887 and reliable trapping data obtained from the Montana Department of Fish, Wildlife, and Parks (MDFWP) beginning in 1950. These data show continuous presence of lynx in Montana. The dynamics of the trapping data appear to be associated with patterns of lagged synchrony; peak harvest data correspond in time and magnitude with a two-year lag time between Montana and southwestern Canada. They concluded that lynx trapped in the twentieth century could have been produced by a local population, or be mostly immigrants or any combination of local lynx and dispersers. In summary, the range of lynx in the contiguous United States is comprised of areas supporting resident, breeding populations and areas supporting occasional dispersers. Specifically, in southwestern Montana where naturally occurring patchy and drier forest types make habitat more marginal, dispersers are supported more than resident populations. It is unclear at this time what role the Gallatin Forest and adjacent Yellowstone National Park play in the long-term survival of lynx. However, the Recovery Outline (USDI 2005) roughly identifies the Gallatin National Forest serving as ‘core’ or ‘secondary’ areas, which further implies the present or historic presence of lynx and the potential role of the Gallatin Forest in lynx recovery.

With this in mind, lynx are considered a potential and confirmed resident of occupied habitat on the Gallatin Forest. Lynx have been trapped here as recently as 1997 on the Gallatin National Forest (Giddings, personal communication). Trapping records beginning in 1978 indicate that approximately 20 individual lynx were legally trapped before MDFWP’s change in trapping regulations in the winter of 2000-2001 to exclude the capture of lynx. No incidental take of lynx has been reported since the closure. Lynx observation data from the Montana Natural Heritage Program (MNHP 2004) database include 20 observations or tracks, some of which are duplicates of the trapping record. Snow track surveys and DNA analysis have confirmed lynx presence in the Absaroka Mountains. In addition, a three-year lynx hair snare survey, following the National Lynx Detection Protocol (McKelvey 1999) began in 2002; two of the genetically analyzed collected hair samples were identified as lynx. Murphy et al. (2004) also report the presence of lynx verified by DNA analysis in Yellowstone National Park, including offspring. They suggest that, though limited to distribution, the species persists at low densities and that population persistence may be provided by reproduction of resident females.

ANALYSIS METHODOLOGY

The LCAS (Ruediger et al. 2000) is the primary basis for determining effects to lynx. There are no specific methodologies for determining effects to lynx other than guidelines and standards identified in the LCAS. A Conservation Agreement between the US Forest Service and the US Fish and Wildlife Service committed the Forest Service to use the LCAS in determining the effects of actions on lynx until the Forest Plans are amended (USDI 2003, USDA and USDI 2005). To address compliance with the Conservation Agreement and the LCAS habitat standards, effects to Canada lynx were evaluated by assessing the travel planning proposal and alternative(s) subsequent effects to those guidelines and standards that apply to these specific actions. Standards and guidelines were developed based on risk factors and credible scientific evidence. Those risk factors are described in Chapter 2 of the LCAS. Those that apply to the travel planning alternatives include those factors affecting lynx productivity (recreation, Forest/ backcountry roads and trails), factors affecting lynx mortality (legal and non-target trapping, incidental or illegal shooting, competition and predation as influenced by human activities), and other large-scale risk factors (lynx movement and dispersal across shrub-steppe habitats).

As stated above, direction for habitat management for lynx is found in the LCAS (Ruediger et al. 2000), which outlines guidelines and standards at the programmatic and project level of planning. The proportion of unsuitable lynx habitat and lynx denning (and foraging) habitat would not be changed with any of the travel planning alternatives as no vegetation treatment is proposed. In regards to travel management, key information is found in Conservation Measures, Chapter 7 in two sections (pages 7-8 to 7-10); Recreation Management and Forest/Backcountry Roads and Trails. Most objectives, standards and guidelines in these two sections are aimed at addressing areas of primary concern. One concern relates to landscape scale connectivity of lynx habitat. This is a basic habitat characteristic that is important to the conservation of many species, including many wide-ranging mid-size and larger carnivores. Another habitat concern is unique to lynx and revolves around potential competing predators who may utilize packed snow routes for access into areas normally only accessible to lynx. The standards and guidelines incorporate recommendations on location and use of public roads and motorized trails, particularly during periods of winter use. Table 3.13. 1 through Table 3.13. 3 below outline the conservation measures applicable to the Travel Plan alternatives and pertinent discussion relative to those conservation measures.

Table 3.13. 1 Conservation measures applicable to all programs and activities.

Programmatic Planning (7-3)	
Standards	**Discussion**
S1 - Conservation measures will generally apply only to lynx habitat on federal lands within LAUs.	Standards were only measured against existing conditions on federal lands in lynx habitat for direct and indirect effects with three exceptions: 1) summer motorized routes and over-the-snow routes were measured in total even if they transverse private lands; 2) areas of non-habitat were included in calculations of snowmobile restriction area changes on National Forest; and 3) private lands within the LAUs were qualitatively discussed in the cumulative effects section.

S2 - Lynx habitat will be mapped using criteria specific to each geographic area to identify appropriate vegetation and environmental conditions	In compliance with LCAS Project Planning Standards regarding habitat delineation, a map identifying primary lynx habitat is located in the electronic files in the Gallatin GIS library.
S3 - To facilitate project planning, delineate LAUs; LAUs should be at least the size of area used by a resident lynx and contain sufficient year-round habitat	See section below on LAUs on the Gallatin National Forest
S4 - LAU boundaries will not be adjusted for individual projects, but must remain constant	See section below on LAUs on the Gallatin National Forest

Programmatic Planning (7-3)	
Standards	**Discussion**
S5 - Limit disturbance within each LAU: if more than 30% of lynx habitat within a LAU is currently in unsuitable condition, no further reduction of suitable conditions shall occur as a result of vegetation management by Federal agencies	Baseline habitat standards will not be analyzed in detail by alternative. The proportion of unsuitable lynx habitat would not be changed with any of the travel planning alternatives as no vegetation treatment is proposed.
Project Planning (7-4)	
Standards	**Discussion**
S1 - Within each LAU, map lynx habitat; identify potential denning and foraging habitat (hares, squirrels, etc.), and topographic features important for lynx movement (major ridge systems, prominent saddles, and riparian corridors); identify non-forest vegetation (meadows, shrublands, grasslands, etc.) adjacent to and intermixed with forested lynx habitat providing habitat for alternate lynx prey species	*Not applicable for this analysis at programmatic level.* Primary lynx habitat is located in the electronic files in the Gallatin GIS library. Willow, aspen, and sagebrush habitats adjacent to conifer habitats mapped as lynx habitat have also been identified as secondary habitat. *Further NEPA analysis would be required for implementation of the selected travel plan alternative.*
S3 - Maintain habitat connectivity within and between LAUs.	It is essential that landscape connectivity between lynx habitats and populations in Canada and the contiguous United States be maintained (USDI 2003).

Table 3.13. 2 Conservation measures to address risk factors affecting lynx productivity.

Recreation Management (7-9) - Programmatic Level	
Standards and Guidelines	**Discussion**
S1 - On federal lands in lynx habitat, allow no net increase in groomed or designated over-the-snow routes and designated snowmobile play areas by LAU unless the designation serves to consolidate unregulated use and improves lynx habitat though a net reduction of compacted snow area (Ruediger et al. 2000, Mcallister 2003).	This standard was developed to meet the programmatic planning objective listed under Recreation Management (LCAS:7-8, Ruediger et al. 2000): "plan for and manage recreational activities to protect the integrity of lynx habitat." The focus is to minimize snow compaction in lynx habitat.
S2 - Map and monitor the location and intensity of snow compacting activities… that coincide with lynx habitat, to facilitate future evaluation of effects on lynx as information becomes available.	This analysis considered known over-the-snow winter recreation and identified those areas of lynx habitat accessible with over-the-snow winter recreation as it related to LCAS standards and guidelines.
G1 - Provide a landscape with interconnecting blocks of foraging habitat where snowmobile, cross-country skiing, snowshoeing, and other snow compacting activities are minimized or discouraged.	*Not applicable for this analysis* –Foraging habitat is well distributed across the Forest and generally precludes over-the-snow activities. In addition, over-the-snow activities are limited due to wilderness designation, topography, accessibility, or other restrictions.

G2 - As information becomes available on the impact of snow-compacting activities and disturbance on lynx, limit or discourage this use in areas where it is shown to compromise lynx habitat.	Existing and ongoing literature and research was used to conduct analysis.

Forest/Backcountry Roads and Trails (7-10) – Programmatic Level	
Standards and Guidelines	**Discussion**
S1 - On federal lands in lynx habitat, allow no net increase in groomed or designated over-the-snow routes and snowmobile play areas by LAU. (This standard is similar to S1 – Recreation Management.)	Plowed roads and groomed over-the-snow routes may allow competing carnivores such as coyotes and mountain lions to access lynx habitat in the winter, increasing competition for prey (Ruediger et al. 2000).
G1 - Determine where high total road densities (>2 miles per square mile) coincide with lynx habitat, and prioritize roads for seasonal restrictions or reclamation in those areas.	Further research directed at elucidating the effects of road density on lynx is needed (Ruediger et al. 2000).
G2 - Minimize roadside brushing in order to provide snowshoe hare habitat.	*Not applicable for this analysis* but may be an indirect effect of implementation of the selected travel plan alternative if it includes reconstruction, rerouting, etc. of selected roads and/or trail routes *for which further NEPA analysis would be required*.
G3 - Locate trails and roads away from forested stringers.	*Not applicable for this analysis.* See G2. Landscape connectivity may be provided by narrow forested mountain ridges, plateaus, or forest stringers that link more extensive areas of lynx habitat (Ruediger et al. 2000).
G5 - Minimize building of roads directly on ridgetops or areas identified as important for lynx habitat connectivity.	

Table 3.13. 3 Conservation measures to address mortality risk factors; movement/dispersal.

Mortality Risk Factors - Programmatic Level Standards and Guidelines (LCAS, 7-12 to 16)	
Trapping (7-12)	Discussion
G1 - Federal agencies should work cooperatively with States and Tribes to reduce incidental take of lynx related to trapping.	Lynx are known to be vulnerable to trapping. Lynx may be more vulnerable to trapping near open roads (Ruediger et al. 2000).
Shooting (7-12)	Discussion
G1 - Initiate interagency information and education efforts throughout the range of lynx in the contiguous states. Utilize trailhead posters, magazine articles, news releases state hunting and trapping regulation booklets, etc., to inform the public of the possible presence of lynx, field identification, and their status.	Lynx may be mistakenly shot by legal predator hunters seeking bobcats, or illegally by poachers. Prey species may also be affected by legal shooting (Ruediger et al. 2000).
Competition and Predation as Influenced by Human Activities (7-13)	Discussion
S1 - On federal lands in lynx habitat, allow no net increase in groomed or designated over-the-snow routes and designated snowmobile play areas by LAU unless the designation serves to consolidate unregulated use and improves lynx habitat though a net reduction of compacted snow area.	Habitat changes that benefit competitor/ predator species, including providing packed snow travel ways, may lead to increased starvation or direct mortality of lynx (Ruediger et al. 2000).
Movement and Dispersal - Programmatic Level Standards and Guidelines (LCAS, 7-12 to 16)	
Highways (7-14)	Discussion
G1 - Dirt and gravel roads traversing lynx habitat (particularly those that could become highways) should not be paved or	Highways impact lynx by fragmenting habitat and impeding movements. Special concern must be

otherwise upgraded … in a manner that is likely to lead to significant increases in traffic volumes, traffic speeds, increased width of the cleared ROW, or would foreseeably contribute to development or increases in human activity in lynx habitat.	given to the development of new highways including gravel roads being paved (Ruediger et al. 2000).

Effects Parameters

Lynx habitat components i.e., temporary unsuitable, denning, and foraging, would remain constant among all the alternatives. Therefore, only the standards and guidelines relative to recreation and road management outlined above apply, specifically as they relate to winter and summer motorized use activity, and habitat connectivity, and will be used to analyze the proposed travel plan alternatives. Parameters used to measure effects include summer motorized open road density (ORD), miles of marked or groomed (i.e., designated) over-the-snow (snowmobile and ski) routes, and acres of closed snowmobile area.

The LCAS states that conservation measures generally apply only to lynx habitat within the LAUs. However, roads used to analyze summer motorized ORD include all public and private roads and motorized trails (including closed roads open to ATVs), except project roads, which are defined in the Gallatin National Forest Travel Management Plan and Forest Plan Amendment Starting Benchmark. The area used to calculate open road density (ORD) is the gross acres (public plus private) within each LAU. This ORD value will be measured against the >2.0-mi/sq mi programmatic guideline for Forest/Backcountry Roads and Trails (G1).

Snowmobile and ski routes include total of public miles by LAU that would be marked or groomed, i.e., designated, by alternative. For the purposes of this analysis, "designated" will be defined as over-the-snow routes that are (or potentially will be based on the selected alternative) specifically marked on a map, described in the travel plan, or signed on the ground as per the LCAS - Clarifications and Revised Terminology approved glossary definition (Lynx/ Wolverine Steering Committee 2001). Over-the-snow routes determined through this travel planning effort would be signed and indicated on a visitor recreation map.

Conversely, "dispersed" use may be defined as recreation activity that occurs off of designated routes (which would be allowed during winter travel only where not otherwise restricted) and that occurs outside of developed areas that support concentrated use. There is an unknown amount of dispersed snowmobile and ski use that is not measured in this analysis. Most of this dispersed over-the-snow use may be accounted for in the calculation of over-the-snow area open (or closed) to snowmobiles although these areas are not closed to skiers. Snowmobile over-the-snow area is calculated as number of acres legally open within the National Forest acres portion of each LAU including non-habitat. The baseline from which to determine an increase or decrease in snowmobile and ski routes and areas will be the existing Gallatin Forest Travel Plan or Alternative 1 (Dixon 2004). Additional qualitative parameters considered to evaluate how recreation activities may affect lynx include type and quality of lynx habitat in which activity occurs, time of year and day activity occurs, type and pattern of activity, and intensity and frequency of activity (Ruediger et al. 2000).

These identified parameters will be discussed by LAU and alternative with some discussion pertinent to individual Travel Planning Areas (TPAs) when (SSs appear to approach or exceed

standards. Additional qualitative discussion may be needed at the Gallatin Forest level. Private lands within individual LAUs will be discussed in cumulative effects. For effects parameters of summer motorized ORD, open over-the-snow designated routes, and closed snowmobile areas, the number displayed to determine compliance with LCAS standards and guidelines will err conservatively, favoring the lynx, due to the inclusion of segments of routes and areas that bisect or overlap non-habitat but may be receiving some level of use. The data still provides a relative comparison by alternative and also provides some level of assessment of the habitat connectivity Project Planning Standard (S3).

Lynx Analysis Units (LAU) on the Gallatin National Forest

As part of the requirements of the LCAS, LAUs were mapped for the Gallatin National Forest in 2000. Approximately 25% of all LAUs did not meet the guideline for size and amount of lynx habitat within each LAU. Lynx Analysis Units (LAUs) were reviewed by the Lynx Biology Review Team and, based on their recommendations, LAUs were reconfigured in 2005. (See attached maps.)

LAUs should generally be 16,000 to 25,000 acres in contiguous habitat and likely should be larger in less contiguous, poorer quality, or naturally fragmented habitat. Programmatic guidelines suggest, "at least 10 sq mi of primary vegetation should be present within each LAU to support survival and reproduction" (Programmatic Planning Guideline:7-4). LAUs should approximate the size of a female's home range and encompass all seasonal habitats (Ruediger et al. 2000). LAUs on the Gallatin National Forest vary in size from 38,738 to 160,039 acres. Some LAUs include a majority of designated Wilderness acreage at elevations and in habitat types that do not constitute lynx habitat. Other LAUs possess lynx habitat in a patchy juxtaposition which may be marginal in its ability to provide lynx with habitat components essential for their adaptations due to the amount of adjacent non-habitat or private land. However, these LAUs could potentially still be used as traveling habitat by dispersing lynx. See Figure 3.13.1 that displays the LAUs on the Gallatin Forest.

Figure 3.13.1 – Gallatin National Forest Lynx Analysis Unit Index

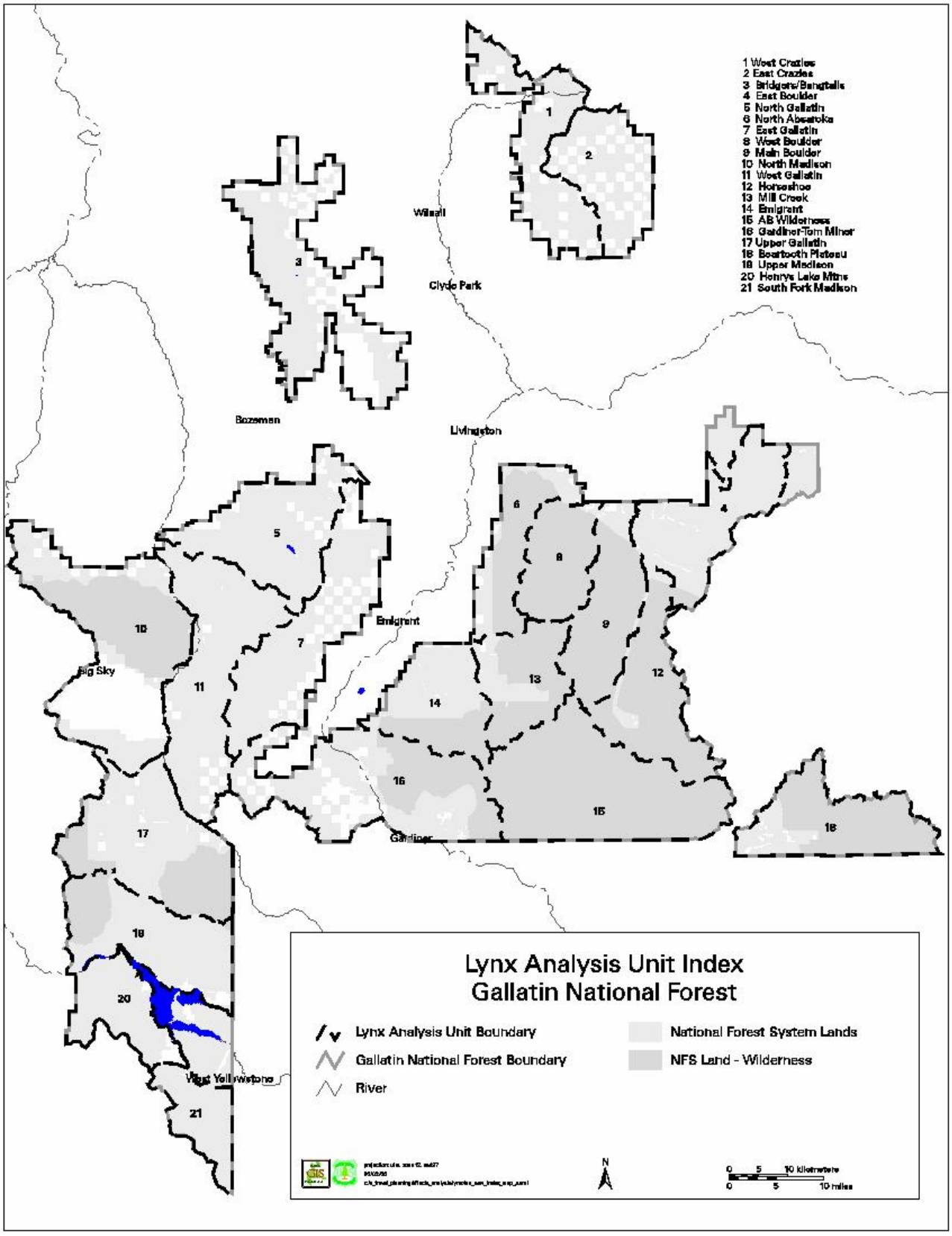


Table 3.13. 4 (below) displays all the LAUs by Ranger District on the Gallatin National Forest, ORD, miles of snowmobile and ski route, and acres closed to snowmobiles for Alternative 1 or existing condition. The snowmobile and ski route column includes all groomed and/or marked routes, which are proposed as an emphasized use. The closed snowmobile area is that area where dispersed use by snowmobiles may not occur off of designated groomed and/or marked trails. This will serve as a baseline from which to compare the Travel Plan alternatives relative to the change in snow compacted routes and areas. It will also serve as a point from which net increases and potential compensatory decreases in snowmobile area can be analyzed and discussed. Net National Forest acreages are displayed because the LCAS states *"Conservation measures will generally apply only to lynx habitat on federal lands within LAUs"* (Programmatic Planning Standard:7-3). All LAUs contain at least 10 sq mi (6,400 acres) of primary lynx habitat.

Table 3.13. 4 Gallatin Forest LAUs: summer ORD, winter miles/ acres, Alternative 1.

LAU	Total LAU Acres (FS acres only)	Acres of Lynx Habitat w/in LAU	Summer Open Road Density (mi/sq mi)	Miles of Snowmobile plus Ski Route	Snowmobile Area CLOSED (acres of LAU)
AB Wilderness	160,039	89,516	0.0	0	0
Beartooth Plateau	81,935	17,660	0.3	40	0
Bridger/Bangtails	88,786	32,518	1.9	66	4,729
East Boulder	84,764	27,973	0.9	13	0
East Crazies	47,096	19,948	0.6	0	0
East Gallatin	90,151	44,239	1.5	5	21,200
Emigrant	70,592	23,875	0.4	2	11,005
Gardiner-Tom Miner	127,408	48,088	0.8	21	31,709
Henry's Lake Mtns	48,161	29,716	1.2	5	24,725
Horseshoe	84,020	27,392	0.0	15	0
Main Boulder	72,669	26,224	0.1	6	0
Mill Creek	63,170	26,928	0.6	20	0
North Absaroka	59,673	30,608	0.2	2	1,683
North Gallatin	89,941	62,464	1.4	82	31,439
North Madison	118,727	69,649	1.1	37	452
South Fork Madison	38,738	34,158	1.6	66	4,676
Upper Gallatin	120,670	58,749	0.5	14	19,083
Upper Madison	93,028	51,328	0.6	31	5,499
West Boulder	56,236	24,535	0.1	0	0
West Crazies	68,378	44,029	1.4	23	0
West Gallatin	122,539	72,539	1.1	87	22,354
TOTAL	1,786,721	862,136	0.8	535	178,554

DIRECT AND INDIRECT EFFECTS ON LYNX

Effects Common to all Alternatives

This section addresses the potential effects that the Travel Plan alternatives may have on lynx and lynx habitat. The presence of roads and trails can directly and indirectly affect lynx and lynx habitat. Directly, road or trail building through lynx habitat can reduce the total amount of habitat available and pose a threat to mortality from vehicles. Indirectly, the impacts of roads include increased access for both legal and illegal hunters and trappers, decrease in prey habitat, increased

access during winter for competing carnivores, and disruption of lynx travel and hunting patterns, and potential avoidance of human activity areas (Koehler and Brittell 1990, Brittell et al. 1989).

Direct Effects

The mere presence of roads represents a direct loss of habitat. Generally speaking, lynx habitat and grass/shrubland or riparian habitat serving as interconnected blocks between lynx habitat would improve with the implementation of Alternatives 2-7M, due to the restriction of travel to designated routes and subsequent reduction in road and trail density. No vegetation treatment is proposed with this analysis and the habitat components of denning and foraging will not change. Any ground disturbing activities resulting from implementation of a selected Travel Plan alternative and subsequent additional environmental analysis (e.g., for trail relocation) would not be a measurable effect. Therefore, the direct effects of loss of habitat will not be discussed further. Refer also to Issue 9: General Wildlife.

Indirect Effects

Summer Motorized Use

The likelihood of lynx encountering people has dramatically increased over the last few decades because of elevated levels of human access into lynx habitat. Roads and trails, snowmobiles, off-road vehicles, and ski area developments enable human access into historically remote forests, thereby increasing the likelihood of lynx being displaced from otherwise suitable habitats and increasing the vulnerability of lynx to human-induced mortality. Roads constructed for forest management, mining or recreational purposes may increase the vulnerability of lynx to hunters and trappers (Koehler and Aubry 1994).

Elevated levels of human access into forests are a threat to Canada lynx because they increase the likelihood of lynx encountering people, which may result in displacement of lynx from their habitats and/or possible injuries or deaths by intentional or unintentional shooting, trapping and vehicle accidents (Brittell et al. 1989, Koehler and Brittell 1990, Olliff et al. 1999). Roads into areas occupied by lynx may pose a threat to lynx from incidental harvest or poaching (Koehler and Brittell 1990) and disturbance or mortality from vehicles (Aubry et al. 1999). Disturbance, as it might relate to displacement effect from either motorized or non-motorized human presence, is generally not an issue. However, Olliff et al. (1999) stated that human disturbance causes lynx to avoid habitats that are otherwise suitable and may preclude lynx from using habitat in an optimal manner. Lynx seem to not avoid roads except at high traffic volumes. However, summer use of roads and trails through denning habitat may affect lynx if kittens are moved due to associated human disturbance (Ruediger et al. 2000).

Lynx avoid open areas and use mature forest or forest with dense cover, tall shrubs, and well-vegetated riparian areas as travel corridors. Corridors may include tops of ridges and riparian zones where subalpine fir, lodgepole pine, and spruce provide greater than 30 percent canopy cover (Olliff et al. 1999). Lynx will use some types of roads for hunting and travel down old roads <50 feet wide with good cover along both edges (Koehler and Brittell 1990) and cross openings <100 meters (approximately 300 feet) in width (Koehler and Aubry 1994). However, roads may disrupt lynx

travel and hunting patterns. Koehler and Aubry (1994) concluded road construction and maintenance are important components of lynx habitat management because they both destroy and create prey habitat, but also make lynx more vulnerable to human-caused mortalities.

Brittell et al. (1989) recommend that roads be maintained to a minimum possible standard to discourage heavy public use disturbance. Koehler and Brittell (1990) also recommend that roads should be maintained to primitive standards to mitigate effects to lynx. As lynx do travel along roads with <50 feet right-of-way, they also recommend that vegetation growing along the edge of the road be maintained as cover for lynx and browse for snowshoe hare. There are no recommended thresholds for lynx in the literature in terms of open road density, however, roads may pose a risk (incidental trapping, accidental vehicle death, or illegal shooting) to the reproduction and/or survival of lynx within a particular home range. The LCAS provides a programmatic guideline for Forest backcountry roads and trails relative to road density at 2 mi/sq mi. In the recently published Federal Register (USDI 2003) that addressed potential threats to lynx, the US Fish and Wildlife Service concluded that the threat to lynx populations from high traffic volume on roads that bisect suitable lynx habitat is low.

Winter Routes

Based on knowledge of lynx natural history, the winter season is most critical due to scarce prey base and breeding biology needs. Changes in winter access affect vulnerability of this species to trapping as well as their ability to capitalize on the habitat niche for which they are adapted (deep snow, high elevations, moist habitat types). To be considered lynx habitat, an area must have the potential to sustain a lynx population over a period of time, which includes supporting the appropriate vegetation composition and structure to support adequate snowshoe hare densities and deep snow where lynx are at a competitive advantage (USDI 2003).

Deep, low-density snow allows lynx to exploit higher elevation areas during winter that typically exclude competitors such as coyotes, bobcats, and mountain lions (Claar et al. 1999). These potential competitors have considerably higher foot loading values relative to the size of the body: paw size thus giving them a lower support capacity and requiring a greater energy exertion to traverse snow. Although their diets may overlap, differences in habitat selection may minimize competition for prey resources (hares) between lynx and other predators, especially during winter. However, opportunities for resource overlap and increased competition for prey among these species may increase during winter due to increased access from plowed roads and snowmobile trails that are maintained for winter recreation, enabling coyotes and bobcats to access lynx winter habitat (Koehler and Aubry 1994).

According to Claar et al. (1999), Ruediger et al. (2000), Kolbe (2005), and Bunnell et al. (2004), packed trails created by winter use activities may negatively impact lynx populations through interference and/ or exploitation competition. Availability of compacted snowmobile trails may provide other predators, especially coyotes, access to lynx habitat during annual periods of deep snow that facilitates competition for primary prey (snowshoe hare) predation opportunities or by directly killing lynx. The subsequent decrease in snowshoe hare numbers available to lynx may negatively affect lynx distribution and abundance (Kolbe 2005).

Bunnell et al. (2004) completed research in Utah that supports the hypothesis that trails compacted by winter recreational use does break down the spatial segregation of lynx and coyote and facilitates coyotes' exploitation of areas of deeper snow. The results suggest that coyotes need the presence of a packed trail but also persistence of packed trails, i.e. the spatial arrangement of snowmobile trails and consistency of use providing a reliable source of packed trails (groomed or ungroomed) are factors that may determine coyote impacts on lynx. He suggested that their research findings of coyote use on snowmobile trails added legitimacy to management steps taken to reduce the potential impacts of coyotes on lynx conservation. However, this study area did not detect the presence of lynx so conclusions were based on potential impacts to lynx habitat was used as a surrogate when looking at coyote access to areas of during deep snow conditions. Additional research needs were noted to look at the simultaneous evaluation of sympatric coyote and lynx populations to identify and quantify the actual extent of exploitation and interference competition. However, Kolbe (2005) looked at the degree of sympatry between lynx and coyote during deep snow winter conditions, coyote behavior on compacted snowmobile trails, and coyote winter food habits near Seeley Lake, Montana. He indicated that coyotes were consistently present in deep snow areas used by lynx and his research suggests that although coyotes use packed snow corridors more than expected, the majority of coyote travel distance is on non-compacted snow. While there was no selection for compacted over non-compacted road surfaces, he found that coyotes did select for shallower and more supportive snow conditions where they naturally occurred in forested stands. Coyotes did not appear to use compacted snowmobile trails to locate or acquire food on the study area and there was only three snowshoe hare kills out of eighty-eight feed sites. Kolbe (2005) concluded that the influence of snowmobile trails on coyote movements and foraging success during winter appeared to be minimal.

Despite current research, there continues to be no solid, consistent data on the role of competition between lynx and other species. In the recently published Federal Register (USDI 2003) that addressed potential threats to lynx, the US Fish and Wildlife Service concluded: 1) There is no evidence that any competition that may exist between lynx and other species exerts a population-level impact on lynx and 2) No evidence has been provided that packed snow trails facilitate competition to a level that negatively affects lynx. Neither factor is considered a threat to lynx populations, but possibly to individuals.

Lack of research on the magnitude of disturbance or displacement of lynx by winter recreation activities makes it difficult to assess the effect. Both snowmobiling and cross country skiing tends to occur in or adjacent to lynx habitat and both require some level of infrastructure development, such as road plowing or grooming, that concentrates use in those areas and may reduce the effectiveness of lynx habitat (Olliff 1999). Snowmobiling in particular may impact lynx adversely due to the potential for disturbance to be dispersed and occur at a higher level of frequency and intensity. While both skiing and snowmobiling result in snow compaction, the density and extent of compaction created only by snowmobiles may affect predator communities (Kolbe 2005). However, lynx will tolerate moderate levels of snowmobile traffic through their home ranges Mowat et al. (1999)and may show some habituation to snowmobile activity where it is temporally and spatially consistent (Olliff et al. 1999). If non-motorized winter recreation activities are not on a groomed or marked trail that receives consistent use, they may potentially affect lynx more than motorized uses due to the dispersed and unpredictable activity (Olliff 1999). Despite the activity

that causes effects to lynx during the winter, they may cause lynx to expend energy beyond their caloric intake, decreasing natality and increasing mortality (Olliff 1999).

Winter snow tracking found that road edges and trails are often followed by lynx for considerable distances, particularly roads less than 15 m wide (Aubry et al. 1999). However, increasing human access into Canada lynx habitat has increased the vulnerability of Canada lynx to both legal and illegal harvest in areas that, historically, were relatively isolated from humans (Todd 1985). Lynx are particularly vulnerable to exploitation by trapping (Bailey et al. 1986); they are relatively easy to capture, appear to have little fear of human scent, respond to baits and lures, and can be attracted by visual attractants (Mowat et al. 1999). Therefore, trapping can be a significant source of mortality for lynx and can depress populations where exploitation is intense and recruitment is low.

Currently, MDFWP has closed the trapping season for lynx. Accidentally trapped and released lynx must be reported within five days of release if uninjured, or immediately if injured. Although travel and harvest restrictions can regulate legal harvest, incidental captures associated with bobcat and coyote trapping in lynx habitat will occur (Hash 1990) and opportunities for the illegal take of lynx will continue or increase (Brittell et al. 1989). However, precautions taken by the State to restrict lynx trapping have likely prevented and continue to prevent the over-harvest of resident lynx (USDI 2003). Giddings (2004) considers the risk of incidental take to be extremely low but cannot predict illegal activity. In the recently published Federal Register (USDI 2003) that addressed potential threats to lynx, the US Fish and Wildlife Service concluded that the threat to lynx populations from illegal harvesting is low, but individuals may be taken.

Habitat Connectivity

Animals move across landscapes to meet daily, seasonal and lifetime needs (Craighead 2002). In the Rocky Mountain/Cascades region, much of lynx habitat is naturally disjunct and habitat connectivity is required across large geographic areas to facilitate dispersal and genetic exchange. Maintenance of habitat quality requires maintenance of linkages, connectedness and interspersion over geographic areas large enough to benefit individuals and join individuals into populations. Activities that fragment, dissect and isolate habitats have undesirable effects on all forest carnivores. Fragmentation is most frequently caused by human activities including road construction (Lyon et al. 1994). Roads and trails can be over-the-snow routes, which can also contribute to loss of habitat connectivity. Maintaining travel corridors between populations may be important to ensure the long-term viability of peripheral or isolated populations in the western mountains (Koehler and Aubry 1994). In the short-term, restricted movements can have negative impacts on populations and ecosystem function. In the long-term, restricted movements can reduce gene flow and have negative impacts on metapopulations and species (Craighead 2002).

According to Craighead (2002), Koehler (1990) and Koehler and Brittell (1990), when moving between denning and foraging habitats, lynx select areas of high canopy closure and avoid open areas, which may disrupt movement patterns if greater than 100 m in width. Aubry et al. (1999) also assert that paved roads or highways were crossed less than random expectations within home ranges (Apps 1999) and may have an influence on lynx spatial organization and movements. Apps (1999) also suggested that dominant natural and human features (such as terrain and the Trans-Canada Highway) may constrain dispersal options. Conversely, Ruggiero (1999), Squires and Laurion (1999) and Aubry et al. (1999) found that lynx move across fragmented landscapes and

have documented lynx movements crossing open valley bottoms and large rivers concluding that these landscape features are not absolute barriers to dispersal.

According to the US Fish and Wildlife Service (USDI 2003), lynx are dispersers where boreal forest is isolated, patchy, or of marginal quality such that it cannot sustain a resident breeding population. Lynx that have attempted what appeared to be dispersal (movement from a place of residence to breeding site) have not been successful in southern boreal forests due to movements cut short when the animal died (trapped). Aubry et al. (1999) documented lynx making exploratory movements where they make long-distance movements beyond their normal home range boundaries and subsequently return. They speculate that the distribution of high quality habitat is patchy and fragmented due to topographic relief and variation in habitat conditions. Therefore, in montane systems with high amounts of spatial heterogeneity, exploratory movements to locate suitable habitat may enhance dispersal success. While successful dispersals can result in the colonization of unoccupied habitats and contribute to the persistence of the metapopulation, only a few areas in the contiguous United States historically supported adequate quality and quantity of habitat to support resident lynx populations over time (USDI 2003).

In the recently published Federal Register, the US Fish and Wildlife Service (USDI 2003) asserts that no information currently exists to determine the level at which traffic volume or roadway design may influence or create an impediment to lynx movement. They addressed potential threats to lynx and concluded that the threat to lynx populations from high traffic volume on roads that bisect suitable lynx habitat and associated suburban developments is low. In addition, they concluded that there is low threat to the contiguous United States lynx population to maintain connectivity between habitats in Canada and the United States. They state their belief that all historic habitats, including boreal forest that exists in patches or is of marginal quality, is still available to dispersing lynx except for areas where development has encroached on the boreal forest or is isolated from source lynx populations. The habitat connectivity considerations, and thus the LCAS direction regarding linkage areas, may also apply at a local scale. As stated above, the area closure and designated route proposal, common to all action alternatives would provide some benefit to lynx by concentrating human activity and allowing areas of seclusion outside of the travel corridors. Brittell (1989) recommends managing travel cover to allow movement of lynx within their large home ranges. Major ridges should be managed for travel cover, with emphasis on saddles and of a width $\geq$300 ft.

Activities that may impact the lynx and its habitat are typically localized, and even within a local area the impact an activity may have on lynx can vary depending on the quality and quantity of habitat in a local area or the size of the local resident population (USDI 2003).

As part of the implementation of the interagency Canada Lynx Conservation Agreements, lynx linkage areas were identified. These linkage areas are meant to aid in movement and dispersal of individuals separated by areas of non-habitat (McAllister 2003). A map displaying lynx habitat and linkage areas is available for consideration in planning efforts. They are mapped at a broad scale and need further refinement to be fully utilized. The lynx linkage areas that were identified for the Gallatin Forest include the North Bridgers to the Big Belt Mountains area, Castle Mountains to northern Crazy Mountains area, Crazy Mountains to the Absaroka Mountains area, the Crazy Mountains to Bridger Range area, the Bridger Range to Gallatin Range area (Bozeman Pass), the

Henry's Lake Mountains to Gravelly Range area (Reynolds Pass), the Gallatin Range to Absaroka Mountains area (Yankee Jim), and areas between the Cooke City to Yellowstone National Park and Custer National Forest areas. There is no specific direction of how to manage for these linkage areas relative to travel planning, habitat manipulation, or development. In addition, the North Bridgers to the Big Belt Mountains, Crazy Mountains to the Absaroka Mountains, the Crazy Mountains to Bridger Range, the Gallatin Range to Absaroka Mountains (Yankee Jim), and Cooke City linkage areas that transverse large areas of non-habitat, poor quality habitat, and private lands are influenced by many factors including highways, interstates, railroad beds, rivers, and land development of which the Gallatin Forest has no control. See Issue 3: Biological Diversity and Ecological Sustainability for a further discussion of effects on potential lynx corridors and linkages.

Effects by LAU - Summer

Table 3.10. 3 displays all the LAUs on the Gallatin National Forest and their respective summer ORD, by alternative. The LCAS provides a programmatic guideline for Forest backcountry roads and trails relative to road density of over 2 mi/ sq mi.

Table 3.13. 5 Summer motorized open road and motorized trail density (gross), by LAU, by alternative.

Lynx Analysis Unit	Summer motorized open road and motorized trail density by LAU (in mi/sq mi)						
	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7M
AB Wilderness	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Beartooth Plateau	0.3	0.3	0.3	0.3	0.2	0.2	0.2
Bridger/Bangtails	1.9	1.9	2.0	1.8	1.7	1.7	1.7
East Boulder	0.9	0.9	0.8	0.6	0.5	0.4	0.4
East Crazies	0.6	0.6	0.5	0.5	0.5	0.5	0.5
East Gallatin	1.5	1.5	1.3	1.1	1.1	1.0	1.0
Emigrant	0.4	0.4	0.5	0.5	0.5	0.5	0.5
Gardiner-Tom Miner	0.8	0.8	0.7	0.7	0.7	0.7	0.7
Henry's Lake Mtns	1.2	1.2	1.2	1.2	1.0	0.9	0.9
Horseshoe	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Main Boulder	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Mill Creek	0.6	0.6	0.5	0.4	0.4	0.4	0.4
North Absaroka	0.2	0.2	0.2	0.1	0.1	0.1	0.1
North Gallatin	1.4	1.4	1.5	1.5	1.4	1.3	1.3
North Madison	1.1	1.2	1.2	1.2	1.2	1.1	1.1
South Fork Madison	1.6	1.6	1.6	1.6	1.6	1.5	1.5
Upper Gallatin	0.5	0.5	0.5	0.5	0.5	0.3	0.3
Upper Madison	0.6	0.5	0.5	0.4	0.4	0.3	0.3
West Boulder	0.1	0.1	0.0	0.0	0.0	0.0	0.0
West Crazies	1.4	1.4	1.6	1.4	1.2	1.1	1.1
West Gallatin	1.1	1.1	1.1	1.0	0.9	0.7	0.7
TOTAL	0.8	0.8	0.8	0.8	0.7	0.6	0.7

There are no LAUs that do not meet the 2 mi/ sq mi guideline in any of the alternatives. Any roads targeted for an improvement in level of construction and maintenance standard would likely

encourage a higher level of public use. However, this is probably not an issue since all LAUs have an ORD of < 2 mi/sq mi. Programmatic management objectives would serve to minimize the increased vulnerability to lynx due to improved road standards.

Effects by Alternative - Summer

With the implementation of any of the alternatives, lynx would continue to avoid open areas and use mature forest or forest with dense cover, tall shrubs, and well-vegetated riparian areas as travel corridors. Roads less than 50 feet wide with good cover along both edges openings <100 meters (approximately 300 ft) in width would still be crossed. However, lynx travel and hunting patterns may be disrupted.

Lynx potentially in and around areas frequented by humans may be displaced. This may put lynx at further risk of human-induced mortality and increase their vulnerability to hunters and trappers (incidental trapping, accidental vehicle death, or illegal shooting). Summer use of roads may also increase the vulnerability of any kittens potentially using denning habitat. However, there are no alternatives that exceed the LCAS programmatic guideline for Forest backcountry roads and trails relative to road density of 2.0 mi/ sq mi guideline for any LAUs.

Effects by LAU - Winter

Increases in either snowmobile or ski routes were analyzed in order to address the Recreation Management (S1) and Forest/ Backcountry Roads and Trails (S1) programmatic level standards and the Mortality Risk Factor programmatic level standard (S1). Any net increase in groomed or marked (and therefore "designated") over-the-snow routes must be accompanied by a consolidation of use resulting in a net reduction of compacted snow areas within the same LAU (Mcallister 2003). Therefore, a simple deduction of changes in route miles is not enough to determine if each LAU meets or does not meet this management direction. These LAUs are discussed in more detail to determine if they meet the intent of the LCAS standards and guidelines.

A few of the LAUs had no net change or net decreases in route miles of over-the-snow marked or groomed routes and also had no net change or an increase in closed snowmobile areas for all alternatives. These LAUs are within, lead to, or strongly overlap designated Wilderness areas. They appear in Table 3.13. 6 as shaded rows and include: AB Wilderness, Beartooth Plateau, East Boulder, East Crazies, Horseshoe, Main Boulder, North Absaroka, and West Boulder LAUs. These LAUs meet the Recreation Management (S1) and Forest/ Backcountry Roads and Trails (S1) programmatic level standards and the Mortality Risk Factor programmatic level standard (S1) for over-the-snow routes.

The decreases in route miles or increase in snowmobile closure area acres are due to the alternatives responding to various resource issues or concerns. The effect to lynx of decreased over-the-snow routes and increased snowmobile area closures may be a reduction in vulnerability to trapping and illegal shooting, a reduction in potential competition with other predators and an improved ability to capitalize on an undisturbed habitat niche. However, the degree to which these effects may occur depends on actual lynx presence and the confirmed evidence through research that these mortality risks pertain to the lynx population on the Gallatin Forest.

The remainder of the LAUs had an increase or a decrease in route miles and an increase in percent snowmobile closure area, which varies by alternative (only Alternative 3 in Henry's Lake Mountains LAU resulted in a decrease in snowmobile closure area). Some increases in route miles were only from ski routes, not snowmobile routes, or vice versa. It is important to note that some routes currently exist on the ground, and are receiving some level of use, but count as an increase in route miles due to the alternative proposal to mark or groom the route, i.e. "designate". Also of note is that all over-the-snow routes and areas were calculated regardless of whether they traveled through or consisted of lynx habitat. Therefore, the data is somewhat conservative in favor of lynx.

There is no measure of the level of use each of these designated routes receives. An assumption made is that the closer proximity to high population centers (Bozeman) or high quality snowmobiling (Cooke City and West Yellowstone), the more accessible and, therefore, more use occurs. A higher frequency of use may also equate to a pattern of activity such that consistent compaction occurs in those areas. This may or may not translate to a true biological effect if the use is already occurring on a particular route and the only difference is by virtue of the designation. The variations of these qualitative parameters are discussed by LAU and by alternative.

Table 3.13. 6 and Table 3.13. 7 display all the LAUs on the Gallatin National Forest and their respective total miles of designated over-the-snow marked or groomed routes and acres and percent of closed snowmobile area, by alternative.

Table 3.13. 6 Miles of designated over-the-snow routes, and acres and percent of closed snowmobile area, by alternative by LAU.

LYNX ANALYSIS UNIT	Miles of snowmobile/ski routes, Acres and percent closed snowmobile area																				
	Alt. 1			Alt. 2			Alt. 3			Alt. 4			Alt. 5			Alt. 6			Alt. 7M		
	Mi	Acres	%	Mi	Acres	%	Mi	Acres	%	Mi	Acres	%	Mi	Acres	%	Mi	Acres	%	Mi	Acres	%
AB Wilderness	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Beartooth Plateau	40	0	0	40	0	0	40	0	0	39	3764	5	39	3764	5	39	3764	5	39	1028	1
Bridger/Bangtails	66	4729	5	79	6752	8	99	24578	28	99	24578	28	70	44500	50	82	24578	28	69	19280	22
East Boulder	13	0	0	6	0	0	6	1564	2	6	1564	2	6	1564	2	6	1564	2	2	0	0
East Crazies	0	0	0	0	0	0	0	46918	100	0	46918	100	0	46949	100	0	46918	100	0	46938	100
East Gallatin	5	21200	24	12	21200	24	12	37857	42	12	63291	70	7	74595	83	11	72966	81	6	76552	85
Emigrant	2	11005	16	2	11029	16	8	11968	17	8	11968	17	2	11970	17	2	11968	17	8	19531	28
Gardiner-Tom Miner	21	31709	25	21	31709	25	23	61778	48	23	61778	48	21	68378	54	23	67259	53	22	66838	53
Henry's Lake Mtns	5	24725	51	5	24725	51	20	22254	46	5	24918	52	5	25116	52	5	25116	52	5	28225	59
Horseshoe	15	0	0	15	0	0	15	2396	3	15	2396	3	15	2740	3	15	2396	3	15	0	0
Main Boulder	6	0	0	6	0	0	6	0	0	6	0	0	6	0	0	6	0	0	6	0	0
Mill Creek	20	0	0	20	3525	6	26	3525	6	28	3525	6	20	6441	10	17	3525	6	29	5044	8
North Absaroka	2	1683	3	2	1683	3	2	6136	10	2	6136	10	2	16709	28	2	6136	10	2	2849	5
North Gallatin	82	31439	35	78	31439	35	103	52338	58	99	69616	77	86	69617	77	93	69617	77	90	62060	69
North Madison	37	452	<1	37	452	<1	40	31839	27	40	34939	29	38	34939	29	40	34939	29	38	32652	28
South Fork Madison	66	4676	12	66	4676	12	82	4676	12	74	4676	12	66	4710	12	74	11964	31	71	4864	13
Upper Gallatin	14	19083	16	14	19083	16	37	23903	20	14	23903	20	14	26347	22	14	64345	53	25	45478	38
Upper Madison	31	5499	6	31	5499	6	31	14449	16	31	14449	16	31	15606	17	28	72078	77	37	8076	9
West Boulder	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
West Crazies	23	0	0	23	0	0	33	94	<1	37	94	<1	30	32957	48	32	94	<1	40	22594	33
West Gallatin	87	22354	18	87	22354	18	116	29853	24	116	32253	26	89	47837	39	95	58977	48	106	54972	45
TOTAL	535	178554	10	544	184126	10	699	376126	21	654	430766	26	547	534739	30	584	578204	32	610	496981	28

The remainder of the LAUs indicated an increase or no net change in snowmobile or ski route miles, with three exceptions. North Gallatin, Mill Creek, and Upper Madison LAUs showed a decrease in over-the-snow route miles in Alternative 2, 6, and 6 respectively. Table 3.13. 7 summarizes the degree of increase or decrease of route miles and snowmobile closure area of each LAU, by alternative. Decreases in miles by LAU, by alternative are displayed in parentheses () to indicate a decrease.

Table 3.13. 7 LAUs/ alternatives with increase or (decrease) above baseline of over-the-snow routes and acres of snowmobile area closure.

Lynx Analysis Unit	Miles of increase or (decrease) over baseline											
	Alt. 2		Alt. 3		Alt. 4		Alt. 5		Alt. 6		Alt. 7M	
	Net ↑	Acres of ↑	Net ↑	Acres of ↑	Net ↑	Acres of ↑	Net ↑	Acres of ↑	Net ↑	Acres of ↑	Net ↑	Acres of ↑
Bridger/ Bangtails	13	2023	33	19849	33	19849	4	39771	16	19849	3	14551
East Gallatin	7	0	7	16657	7	42091	2	53395	6	51766	1	55352
Emigrant	0	24	6	963	6	963	0	965	0	963	6	8526
Gardiner-Tom Miner	0	0	2	30069	2	30069	0	36669	2	35550	1	35129
Henry's Lake Mtns	0	0	15	-2471	0	193	0	391	0	1636	0	3500
Mill Creek	0	3525	6	3525	8	3525	0	6441	(3)	3525	9	5044
North Gallatin	(4)	0	21	20899	17	38177	4	38178	11	38178	8	30621
North Madison	0	0	3	31387	3	34487	1	34487	3	34487	1	32200
South Fork Madison	0	0	16	0	8	0	0	34	8	7288	5	188
Upper Gallatin	0	0	23	4820	0	4820	0	7264	0	45262	11	26395
Upper Madison	0	0	0	8950	0	8950	0	10107	(3)	66579	6	2577
West Crazies	0	0	10	94	14	94	7	32957	9	94	17	22594
West Gallatin	0	0	29	7499	29	9899	2	25483	8	36623	19	32618

The LAUs displayed in Table 3.13. 7 would only meet the Recreation Management (S1) and Forest/ Backcountry Roads and Trails (S1) programmatic level standards or the Mortality Risk Factor programmatic level standard (S1) for the alternative(s) shown if the designation resulted in a net reduction of area open to snowmobiles or skiing through a consolidation of unregulated use (per Mcallister 2003). It is assumed that for those LAUs and alternatives that show a combination of an increase in over-the-snow routes and a corresponding increase in areas closed to snowmobiles, some level of compensation may be occurring such that they would be in compliance with LCAS management direction. LCAS management direction for a specific LAU would be met if it showed a decrease in route miles or no increase, i.e., zero. These data are generated from the proposed travel plan GIS maps and do not necessarily represent a true biological effect of increased snow compaction. These numbers were further examined route by route to determine if the route was already receiving some level of use, if the route was within or adjacent to lynx habitat, and if the amount, location, and habitat quality of snowmobile closure areas served to consolidate use within the LAU.

As discussed in the direct and indirect effects section above, increases in over-the-snow compaction (by either routes or areas) may have detrimental effects to lynx habitat and lynx populations. Snowmobile trails maintained for winter recreation may increase lynx vulnerability to trapping and enable coyotes and bobcats to access lynx winter habitat. Access to other predators may facilitate

competition by killing hares (resource overlap) or by directly killing lynx. However, moderate levels of snowmobile traffic may be tolerated, particularly when forest edges are available or the trails are narrow. There is no differentiation between snowmobile routes or ski routes relative to effect on lynx. However, it is somewhat intuitive that snowmobiles produce greater compaction than skis simply due to the pressure per surface area caused by machines vs. a human. Generally, snowmobile routes are also wider, especially if groomed, and produce noise that can carry long distances depending on the terrain.

Both snowmobiles and skiing can produce compacted areas off-trail that could enable competing predators access into areas not normally traveled during the winter. This may be important when considering the effect of snowmobile areas closed to use; skiing may still be occurring and providing some level of compaction thus limiting the compensatory benefit of the closure.

For LAUs that indicate an increase in over-the-snow routes and a corresponding increase in snowmobile closure area, additional information is presented below by alternative. There may be new areas of compaction due to summer routes identified as connectors that would be constructed through forested areas currently now accessible to snowmobilers or skiers. These would not be marked or groomed but if they occur within an area open to snowmobiles, additional compaction may occur. Additional qualitative parameters are considered to evaluate if the net increase in route miles and corresponding area closure does equate to an overall decrease in snow compaction.

Bridger / Bangtails

The Bridger/ Bangtails LAU on the Bozeman Ranger District indicates a net increase of over-the-snow routes under all alternatives. The amount of area closed to snowmobiles varies by alternative. This LAU is close to Bozeman and receives regular snowfall which makes these routes relatively more accessible and likely to receive relatively more use than other LAUs. The intensity and frequency of snowmobile and ski activity produces fairly consistent snow compaction. Bridger Bowl Ski Area and Bohart Ranch Cross-country Ski Center are existing sources of snow compaction within and adjacent to ski area boundaries. Summer connectors proposed in this LAU would not receive additional use or have an effect on lynx due to the routes not being in lynx habitat, located in areas of poor snow quality, or in open terrain that would not require tree removal.

Where the routes designated as marked or groomed currently receive some level of dispersed snowmobile and/ or ski use, the newly designated routes would not substantially add new areas of consistent snow compaction to the LAU. Area closures to snowmobiles increase above baseline in all alternatives and serves to provide some level of compensation for the increase in marked and groomed routes. This is especially true in the Bridger range where the lynx habitat is of a higher quality than the Bangtails. The amount of snowmobile area closure acres Areas proposed for closure are considered rideable snowmobile terrain and contain quality lynx habitat. However, some of this benefit may not be realized where skiers venture into the backcountry and compact snow in those areas closed to snowmobiles.

Alternative 7M indicates a net increase of only 3 miles due to the currently designated ski routes in the Bangtails being dropped from the system. This is more realistic due to marginal snow conditions and lack of use but would not realize any benefits to lynx as the area would still be open to snowmobiles and receive dispersed use and consistent compaction. Alternative 7M would

maintain the southwest side as open to snowmobiles, much of which is not capable and is poor quality lynx habitat. This alternative would allow snowmobile use in the Fairy Lake area which would still receive heavy use and compaction by backcountry skiers if it were closed to snowmobiles. It would further restrict snowmobile use on the northwest side of the Bridger ridge which is less accessible to backcountry skiers, considered rideable snowmobile terrain, and contains approximately the same amount of lynx habitat as the Fairy Lake area where snowmobiling would be allowed. While this may appear to break up the connectivity north to south, it would still serve to concentrate use on marked and groomed routes and reduce overall compaction across the landscape, thus meeting the intent of the LCAS.

East Gallatin

The East Gallatin LAU on the Livingston Ranger District indicates net increases in over-the-snow route miles above baseline in all alternatives. Many of the route mile increases on the north end of the LAU are shared trails and/ or close to the Bozeman area, currently receiving use by both snowmobiles and skiers. In Alternative 7M there are large blocks of closure within the Wilderness Study Area that are serving to consolidate use on designated routes, approximately ½ of which is mapped lynx habitat. While much of these closure areas are not necessarily rideable terrain, there is high quality habitat within the closure areas that would remain inaccessible and uncompacted. Alternative 7M meets the intent of the LCAS due no additional compaction and the high quantity and quality of lynx habitat within large closure areas.

Emigrant

The Emigrant LAU on the Livingston Ranger District indicates a net increase of 6 mi of over-the-snow routes under Alternative 7M. These routes are within what is considered rideable snowmobile terrain although access and snow quality can be poor. The majority of proposed route length increase is not in lynx habitat. Snowmobile closure area acres increase in all alternatives over the baseline. The additional snowmobile closure area in Alternative 7M would serve to consolidate use and reduce compaction although some of this compensation may be negated by occasional backcountry skier use. Alternative 7M would meet the LCAS due to no additional compaction in lynx habitat, route mile increase occurs in areas already receiving snowmobile use, majority of route not in lynx habitat and/ or sufficient snowmobile area closure.

Gardiner-Tom Miner

The Gardiner-Tom Miner LAU on the Gardiner District indicates a net change in over-the-snow route miles of 1 mile net increase in Alternative 7M. These routes are already being used by snowmobilers and skiers so there would be no additional snow compaction than what is already occurring. Although only approximately ¼ of the additional closure area acres are lynx habitat, use would be consolidated to those areas where snowmobile use is allowed. All alternatives would meet the intent of the LCAS.

Henry's Lake Mountains

The Henry's Lake Mountains LAU on the Hebgen Lake Ranger District indicates no net change for Alternative 7M. Alternative 7M does meet the LCAS since there was no change to the amount of over-the-snow route miles.

Mill Creek

Alternative 7M has an increase in over-the-snow in route miles of 9 miles and an increase in snowmobile closure area acres. Approximately ½ of the increase is on a route that already currently receives heavy ski use and is consistently compacted. The route increase is for ski use only within a snowmobile closure area where use would be concentrated on trails as minimal backcountry use opportunities exist. The proposed snowmobile closure area includes lynx habitat and some rideable snowmobile terrain that would eliminate snowmobiles where dispersed use currently occurs and concentrate use in the mainstem of Mill Creek. The Mill Creek area is close to Livingston and currently receives heavy use during winter by snowmobilers, skiers, dog-sledders, and family sledding. None of the alternatives would increase the level of snow compaction above that which already exists and therefore the alternatives meet the LCAS.

North Gallatin

The North Gallatin LAU on the Bozeman Ranger District indicates a net increase in all the alternatives except Alternative 2. Many of these routes are existing roads or open areas that currently receive some level of dispersed use. These alternatives also indicate an increase in snowmobile closure area acres. The proposed snowmobile closure areas include rideable snowmobile terrain within or adjacent to quality lynx habitat. Summer connectors proposed in this LAU may require tree canopy removal on portions of the identified routes, potentially increasing accessibility and additional use but there is heavy snowmobile and/ or ski use immediately adjacent to these areas and/ or the routes are not in lynx habitat so the effect would be minimal.

All of the drainages within this LAU (Little Bear, Cottonwood, Hyalite, and Bozeman Creek) receive heavy use of allowable activities and are managed to create a separation of uses between drainages. If Hyalite Creek road would be plowed to allow better winter access, this would further increase accessibility and intensity creating areas of consistent snow compaction. Thus, the lower the ratio of route miles to snowmobile closure area acres, the closer to meeting the intent of consolidation of use resulting in a net reduction of compacted snow areas within the same LAU.

Alternative 7M plows the Hyalite road while at the same time allowing snowmobiles access to both lower and upper (high elevation basins) portions of the Hyalite drainage. This potentially reduces the overall benefit of attempted consolidation of compaction. However, across the entire LAU, Alternative 7M closes approximately twice as much area to snowmobiles as is closed currently, ½ of which is lynx habitat, thus meeting the intent of the LCAS.

North Madison

The North Madison LAU on the Bozeman Ranger District indicates an increase in over-the-snow route miles for Alternative 7M. The routes to be designated already receive heavy skier use. Summer connectors proposed in this LAU would go through stringers of forested areas with open areas in between which may increase localized accessibility but heavy snowmobiling use occurs in the basins immediately above these connectors.

These alternatives also indicate substantial snowmobile area closures but would result in little benefit to lynx. While mapped as lynx habitat, the proposed closures adjacent to the Lee Metcalf

Wilderness are not considered rideable terrain and receive intermittent snowmobile use. However, any snowmobile activity that does occur would be restricted resulting in an overall net reduction in compaction. Big Sky, Moonlight, and Yellowstone Club ski areas are privately owned acres within this LAU and vastly contribute to a level of snow compaction.

South Fork Madison

The South Fork LAU on the Hebgen Lake Ranger District indicates that over-the-snow route miles and snowmobile closure area acres varies by alternative. Alternative 7M indicates a net increase of 5 route miles and a slight increase in snowmobile closure area acres. This increase is due to a route that is currently heavily used by snowmobiles and snow packed now on a regular basis. While there is no measurable compensation of area closure for net increase in designated route, this route already receives consistent compaction.

This LAU is immediately adjacent to West Yellowstone and very accessible for snowmobile opportunities close to town and Yellowstone Park. This proximity, combined with the groomed Rendezvous Ski Trail system, creates use patterns of high intensity and frequency.

Upper Gallatin

This LAU includes the Taylor Fork drainage which is a very popular recreation destination. Alternative 7M has an increase in snowmobile closure area acres which is about a 3 fold increase in high quality lynx habitat closed to snowmobiles and considered snowmobile rideable terrain, serving to concentrate use in the lower portion of Taylor Fork drainage. The 11 mile net increase in over-the-snow routes includes routes to access the Wapiti cabin from Taylor Fork Road # 134 (through a snowmobile closure area) and from the Sage Creek trailhead. These routes are currently used resulting in no net change in compaction. Alternative 7M meets the LCAS.

Upper Madison

The increase in route miles in Alternative 7M reflects the designation of two designated routes through a snowmobile area closure. The type and pattern of activity on these routes would not change with the new designation. There is also an increase in snowmobile area closure acres which is considered rideable snowmobile terrain but not considered high quality lynx habitat. The majority of the substantial snowmobile closure area acres north of Quake Lake that are included in Alternatives 3-6 were not included in Alternative 7M due to the area not considered capable for snowmobiling. This LAU is immediately adjacent to West Yellowstone and very accessible for snowmobile opportunities close to town and Yellowstone Park, creating use patterns of high intensity and frequency where snowmobiling is allowed. None of the alternatives would increase the level of snow compaction above that which currently occurs.

West Crazies

The West Crazies LAU on the Livingston Ranger District indicates a net increase in over-the-snow route miles for all alternatives except Alternative 2 which shows no net change. What differentiates these alternatives is the amount of net increase with consideration of the amount of snowmobile area closure acres. . Alternative 7M has a net increase of 17 miles but with substantial amounts of snowmobile closure area acres, approximately ½ of which is quality lynx habitat. The routes that

are proposed to be marked include ski trails joining Porcupine and Ibex Cabins. This area currently receives some dispersed snowmobile and ski use and is considered rideable terrain although weather conditions and land ownership dictate use due to marginal snow and poor public access. The proposed snowmobile closure would preclude snowmobile use in some areas currently receiving use and would serve to consolidate use to marked, groomed, or areas otherwise open to snowmobiles. Some backcountry skiing may occur within these snowmobile closure areas but overall compaction would be reduced.

This LAU is close to the communities of Wilsall and Clyde Park. The designated routes south of Ibex Cabin in Cottonwood Gulch, the Shields loop, and the Smith Creek drainage currently receive heavy snowmobile use and are part of a groomed trail system. The summer route proposed to connect two motorized trails would require tree canopy removal and would increase access to snowmobiles for dispersed use. The entire Smith Creek drainage is open to snowmobiles so there is use already occurring in the general vicinity but this new route may encourage a small amount of additional compaction. Alternative 7M would meet the intent of the LCAS due to the favorable combination of net increases in route miles and snowmobile closure area acres.

West Gallatin

The West Gallatin LAU on the Bozeman Ranger District indicates a net increase in over-the-snow route miles for all alternatives except Alternative 2 which shows no net change. There is also an increase in snowmobile closure area acres for those alternatives with net increases in route miles. The routes in Alternative 7M indicate a net increase are currently receiving use as part of existing system or are routes proposed to be marked through snowmobile closure areas. This designation would serve to concentrate use on the marked or groomed routes with large areas closed to snowmobiles, much of which is lynx habitat. This LAU is relatively close to Bozeman (and the Big Sky area) and offers adequate snow conditions for winter activities, creating a pattern of consistent snow compaction across the landscape where snowmobiles are allowed.

The following Table 3.13.X indicate which LAUs would be in compliance with the LCAS. Those LAU - alternative combinations that do not meet the LCAS are shaded for ease of viewing.

Table 3.13. X LAUs Compliance with LCAS by Alternative (Yes or No).

LAU	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7M
AB Wilderness	Y	Y	Y	Y	Y	Y	Y
Beartooth Plateau	Y	Y	Y	Y	Y	Y	Y
Bridger/Bangtails	Y	N	N	N	Y	Y	Y
East Boulder	Y	Y	Y	Y	Y	Y	Y
East Crazies	Y	Y	Y	Y	Y	Y	Y
East Gallatin	Y	N	N	Y	Y	Y	Y
Emigrant	Y	Y	N	N	Y	Y	Y
Gardiner-Tom Miner	Y	Y	Y	Y	Y	Y	Y
Henry's Lake Mtns	Y	Y	N	Y	Y	Y	Y
Horseshoe	Y	Y	Y	Y	Y	Y	Y
Main Boulder	Y	Y	Y	Y	Y	Y	Y
Mill Creek	Y	Y	Y	Y	Y	Y	Y

North Absaroka	Y	Y	Y	Y	Y	Y	Y
North Gallatin	Y	Y	N	N	Y	Y	Y
North Madison	Y	Y	Y	Y	Y	Y	Y
South Fork Madison	Y	Y	N	N	Y	Y	Y
Upper Gallatin	Y	Y	N	Y	Y	Y	Y
Upper Madison	Y	Y	Y	Y	Y	Y	Y
West Boulder	Y	Y	Y	Y	Y	Y	Y
West Crazies	Y	Y	N	N	Y	N	Y
West Gallatin	Y	Y	N	N	Y	Y	Y

Effects - Winter

Alternative 1 may add direct, indirect and cumulative effects to the existing situation. Assuming human recreational activities increase in the future, this alternative has the most potential to affect lynx long term. There is no reasonable logistical way to deter an increase in snowmobile use without designating routes with area closures as proposed in Alternatives 2-7. Snowmobile and ski accessible areas would continue to increase where land topography, snow conditions, and increased technology make it feasible. Regardless of the effects that Alternative 1 may have long-term, it is used as a baseline from which to compare all the other alternatives and measure LCAS standards and guidelines. Displaying the identified parameters (over-the-snow route miles and areas closed to snow compaction by snowmobiles) is meant to take a Forest-wide look at the effect of the Alternative route and area configuration across all LAUs.

Table 3.13. X Alternatives with increase of over-the-snow routes and acres of snowmobile area closure above baseline.

Alternative Totals for all LAUs Forest-wide	Over-the-Snow Route Miles Net Increase from Alternative 1	Acres of Snowmobile Closure Area Net Change from Alternative 1	Acres of Lynx Habitat within Snowmobile Closure Area	Alternative Meets LCAS Y/N
2	9	5,572	3,068	N
3	164	197,572	97,367	N
4	119	252,212	126,880	N
5	12	356,185	180,073	Y
6	49	400,895	220,870	N
7M	75	318,427	169,786	Y

Alternative 7M is in compliance with the LCAS due to all LAUs meeting the intent of the LCAS.

Effects on Habitat Connectivity

Proposed management direction in the form of stated Forest-wide Goals (Goal E. in the DEIS, Goal F. in the FEIS) would serve to highlight and potentially protect those areas considered important to lynx movement. It is unclear how the habitat connectivity of individual alternatives by LAU would be affected through their implementation as proposed. Linkages and opportunities for dispersion improve habitat quality for both individuals and populations. The habitat connectivity

considerations may also apply at a local scale. Lynx may obtain some benefit from the area closure and designated route proposal (both winter and summer), common but variable to Alternatives 2-7M. This would provide some benefit to lynx by concentrating human activity and allowing areas of seclusion outside of the travel corridors. According to the recently published Federal Register (USDI 2003), it is unclear what role traffic and roads play in lynx movement. Monitoring would provide long-term information regarding what areas are consistently compacted and what areas may be available for dispersal or use as a corridor (see Appendix B). Over-the-snow routes may contribute to loss of habitat connectivity. See Issue 3: Biological Diversity and Ecological Sustainability for further discussion of effects on potential lynx corridors and linkages.

Summary of Effects by LCAS Conservation Measures

Table 3.13. 8 summarizes the applicable LCAS conservation measures discussed in the Analysis Methodology section and the extent to which the action alternatives meet them.

Table 3.13. 8 Relationship of proposed alternatives to applicable conservation measures.

Project Planning (7-4)	
Standards	**Meets – Yes/ No**
S3 - Maintain habitat connectivity within and between LAUs.	**YES** for all alternatives – There are no changes to lynx habitat proposed with the Travel Plan as no vegetation treatment is proposed. All alternatives meet the guideline for < 2.0 miles/ sq mile. Also, see Forest-wide Goal for Wildlife Corridor (Goal E in the DEIS and Goal F in the FEIS).
Recreation Management (7-9) - Programmatic Level	
Standards and Guidelines	**Meets – Yes/ No**
S1 - On federal lands in lynx habitat, allow no net increase in groomed or designated over-the-snow routes and designated snowmobile play areas by LAU unless the designation serves to consolidate unregulated use and improves lynx habitat though a net reduction of compacted snow area (Ruediger et al. 2000, Mcallister 2003).	**YES and NO -** Refer to Table 3.13.X for LAUs and highlighted alternatives that indicate compliance and intent of each alternative meeting the LCAS. Some LAUs meet the LCAS for all alternatives; All LAUs meet the LCAS for only Alternative 5 and 7M.
S2 - Map and monitor the location and intensity of snow compacting activities… that coincide with lynx habitat, to facilitate future evaluation of effects on lynx as information becomes available.	**YES** for all alternatives - See Appendix B.
Forest/Backcountry Roads and Trails (7-10) – Programmatic Level	
Standards and Guidelines	**Meets – Yes/ No**
S1 - On federal lands in lynx habitat, allow no net increase in groomed or designated over-the-snow routes and snowmobile play areas by LAU.	See Recreation Management S1 above.
G1 - Determine where high total road densities (>2 mi/sq mi) coincide with lynx habitat, and prioritize roads for seasonal restrictions or reclamation in those areas.	**YES** – for all LAUs, all alternatives. Refer to Table 3.13.5 for summer motorized open road density by LAU by alternative.

Mortality Risk Factors - Programmatic Level Standards and Guidelines (LCAS, 7-12 to 16)	
Trapping (7-12)	**Meets – Yes/ No**
G1 - Federal agencies should work cooperatively with states and tribes to reduce incidental take of lynx related to trapping.	**YES** for all alternatives – On-going cooperation and communication regarding snow tracking surveys for lynx and trapping regulations. MDFWP has closed the trapping season for lynx.

Shooting (7-12)	**Meets – Yes/ No**
G1 - Initiate interagency information and education efforts throughout the range of lynx in the contiguous states. Utilize trailhead posters, magazine articles, news releases state hunting and trapping regulation booklets, etc., to inform the public of the possible presence of lynx, field identification, and their status.	**YES** for all alternatives - Upon implementation of the selected Travel Plan alternative, travel maps would be produced that clearly display areas open and closed to public access, including those routes and areas open for over-the-snow recreation. Other on-going conservation education efforts are accomplished at the programmatic level.
Competition and Predation as Influenced by Human Activities (7-13)	**Meets – Yes/ No**
S1 - On federal lands in lynx habitat, allow no net increase in groomed or designated over-the-snow routes and designated snowmobile play areas by LAU unless the designation serves to consolidate unregulated use and improves lynx habitat though a net reduction of compacted snow area.	See Recreation Management S1 above.
Movement and Dispersal - Programmatic Level Standards and Guidelines (LCAS, 7-12 to 16)	
Highways (7-14)	**Meets – Yes/ No**
G1 - Dirt and gravel roads traversing lynx habitat (particularly those that could become highways) should not be paved or otherwise upgraded … in a manner that is likely to lead to significant increases in traffic volumes, traffic speeds, increased width of the cleared ROW, or would foreseeably contribute to development or increases in human activity in lynx habitat.	**YES** for all alternatives - Additional NEPA analysis would have to be completed for any newly constructed routes or where any ground-disturbance would be required for the implementation of the selected alternative. See Issue 3: Biological Diversity and Ecological Sustainability for further discussion of effects on potential lynx corridors and linkages.

Cumulative Effects

Net Effects of Past and Present Programs and Activities

Many of the programs and activities that occur on the Gallatin National Forest have some influence on lynx or lynx habitat. Adverse or negative effects considered together have contributed to the risk factors which partially led to the listing of lynx as a threatened species under the Endangered Species Act. The risk factors include National Forest programs, practices, and activities that may directly, indirectly, or cumulatively influence lynx or lynx habitat in four major areas: 1) productivity, 2) mortality, 3) movement and dispersal, and 4) other large scale factors. In the determination to list lynx, the FWS concluded that the lack of Forest Plan guidance for lynx

conservation, as evidenced by the fact that Forest Plans allow or direct actions that may cumulatively, adversely affect lynx was a significant threat to lynx.

The combined effects of past and present activities and programs define the current baseline condition on the Gallatin Forest against which the alternatives were evaluated. Based on the past and current vegetation management of the Gallatin Forest, including timber harvest, livestock grazing, prescribed fire, invasive species program and other vegetation projects, forest vegetation conditions provide sufficient habitat for foraging, denning, and dispersal as defined in the LCAS. The effects of different types of dispersed recreation including the outfitter/ guide program, recreation residences; fire suppression; and the lands, minerals, and non-recreation special use programs on the Gallatin Forest have minor, or beneficial, impacts to lynx other than what was considered. Conversely, effects of developed ski areas and associated base area development have contributed to a direct loss or modification of habitat that may be affecting lynx denning, foraging, and diurnal security habitat to some degree. All of these activities combined currently occur and contribute to the baseline from which LCAS standards and guidelines were evaluated.

Projected Combined Effects of Reasonably Foreseeable Programs and Activities

Lynx are a wide-ranging species and do not limit their wanderings to the National Forests. It is very difficult to estimate the cumulative effect resulting from management of the National Forests along with neighboring land management and land uses in the reasonably foreseeable future. However, the fundamental aspect of a cumulative effects analysis includes an attempt to consider all the activities that may potentially affect lynx and occur within and adjacent to National Forest.

There would be no cumulative effects expected to occur from timber harvest, prescribed fire, livestock grazing, invasive species control, or other vegetation projects. The reasonably foreseeable projects for the Gallatin Forest would likely treat a variety of forest types at various scales, much of which is not in lynx habitat. Vegetation treatments with a timber harvest component include projects with variable objectives, including fire salvage, fuel reduction, and restoration of fire adapted ecosystems. Livestock grazing and the invasive species problems are expected to continue into the future and would continue irregardless of travel planning. The adaptive management policy that will be implemented as allotment plans are updated and managing noxious weeds through partnerships and noxious weed mapping and range utilization monitoring efforts will minimize habitat degradation. These efforts are consistent with conservation measures identified in the LCAS.

It is not known what wildfires may occur in the future, or how successfully they will be suppressed, creating or destroying foraging and denning habitat over time. The LCAS encourages restoring fire as an ecological process to move toward landscape patterns consistent with historical succession and disturbance regimes.

No cumulative impacts to lynx are expected from the minerals, lands, and non-recreation special use programs. There are no mineral development projects anticipated for the Gallatin Forest other than those currently occurring and abandoned mines would continue to be closed. It is assumed that the trend toward consolidation of National Forest lands would continue to incrementally add acres of lynx habitat to the total amount of lynx habitat on the Gallatin Forest. Small scale and temporary

special uses have minor impacts individually, but together with additional permits requiring permanent human infrastructure, may contribute to large scale effects. It is unknown at this time the number and scale of any future special use permit requests so the significance of this effect is not known.

Cumulative impacts of dispersed summer and winter use along with other activities in lynx habitat such as the outfitter/ guide program and recreation residences was considered through direct and indirect effects analysis as part of the baseline. The LCAS does not recommend limits to these uses above those evaluated in the direct and indirect effects. No cumulative effect is expected.

The greater potential for cumulative adverse impacts and pressure on lynx recovery is likely to be the result of human activity on off-Forest lands. Private lands within the Forest boundary or immediately adjacent to the Gallatin Forest (including developed ski areas) continue to be developed and may be the most significant impact on lynx. Private developed ski areas would remain on the landscape and most likely increase in size and scale of human developments and populations. Permitted developed ski areas would remain on the landscape with any further development or expansion undergoing analysis relative to LCAS management direction. The USFWS Biological Opinion for the Bridger Bowl expansion project did not define any terms or conditions relative to its recent expansion. The Rendezvous Ski Trails Facility Development Master Plan preferred alternative would result in a net decrease of ski trail mileage and consolidation of groomed trails and would therefore have the lowest potential for competition among lynx and other predators. Cumulative effects to lynx are expected to be low with this project.

Trends indicate increased levels of road improvements on National Forest and road construction adjacent to National Forest on private lands at lower elevations. Recent trends to update travel plans on adjacent National Forests through designation of a route system to comply with the 2005 OHV Final Rule (Federal Register, November 9) have halted further negative effects associated with displacement, disturbance, or death caused by the presence of humans. However, construction of roads on private lands contributes to risk factors for lynx productivity, mortality, and dispersal opportunities. The continued trend of road improvements and construction would increase traffic volumes and increase speeds which would contribute to lynx mortality through vehicle collisions, incidental or illegal shooting, and providing access for trapping. Where these facilities are located in lynx habitat or non-habitat connecting patches of lynx habitat, increased fragmentation may occur and alter how lynx use the landscape. This increasing trend would continue with the selection of any proposed Travel Plan alternative. The LCAS suggests that more research is needed to determine the effects of new road construction and/ or highly roaded areas. Currently, management direction in the LCAS focuses on location of road, particularly in relation to juxtaposition with lynx habitat and areas of habitat connectivity. Incorporating these guidelines would reduce these affects long-term. Assuming that management direction for both summer and winter recreation activities in lynx habitat would be followed there would be no additional cumulative effect from the Gallatin Travel Plan.

The NRLA process underway to amend Forest Plans in the Northern Rockies will incorporate management direction for Canada lynx based on the Lynx Conservation and Assessment Strategy (Ruediger et al. 2000) and more current research. The NRLA decision is in DEIS form and likely to be finalized during 2006, however litigation is likely. The Gallatin Forest will comply with the

LCAS as directed by the Conservation Agreement (USDA and USDI 2006) until a final decision is made on the NRLA. When the final decision is made on the NRLA the Gallatin Forest Plan will follow that direction. Any changed management based on the NRLA Forest Plan amendment effort would contribute to maintaining suitable habitat conditions for lynx recovery that address productivity, mortality, and dispersal.

Cumulative Effects of Past, Present and Reasonably Foreseeable Programs and Activities with the Travel Plan Alternatives

According to the US Fish and Wildlife Service (USDI 2003), putting a local lynx population at risk of extinction would require the activity to occur over a large area of several home ranges and include three factors:

1) Cumulatively result in the conversion of lynx habitat into non-habitat.
2) Result in a homogenous forest that does not provide the various stand ages, species composition, and structure.
3) Effectively preclude dispersal.

The proposed Travel Plan would have no effect on the first two factors as no vegetation treatment is being proposed and denning, foraging, and suitability of lynx habitat will remain static before and after the implementation of any of the alternatives. If vegetation treatments (fuel reduction or timber sale projects) occur that impact these habitat features, further NEPA analysis would be required and weighed against the habitat specific programmatic and project level standards and guidelines in the LCAS or NRLA.

The third factor is discussed under Habitat Connectivity and Issue 3: Biological Diversity and Ecological Sustainability. Further cumulative effects are dependent upon activities on adjacent private or other public lands such as land development and increased roads and/or highways. Areas of non-habitat may also play a role in connectivity across landscapes with little to no vegetative cover or attributes conducive to lynx movement.

The Travel Plan alternatives varied in accordance with the emphasis for each alternative theme or resource issue it addressed. Considering the alternative totals by LAU for summer motorized open road density, none of the LAUs in any of the alternatives result in greater than 2.0 mi/sq mi and thus meet the LCAS. These totals reflect both Wilderness and non-Wilderness, and private roads within individual LAUs. The winter use identified parameters (over-the-snow route miles and snowmobile closure areas) were displayed to provide a look at the effect of each alternative's route and area configuration across all LAUs for consideration of the LCAS intent to minimize snow compaction.

Despite Alternative 1 serving as the 'baseline' for this project, it may add direct, indirect and cumulative effects to the existing situation long-term. Assuming human recreational activities increase in the future, this alternative has the most potential to affect lynx long term. Snowmobile and ski accessible areas would continue to increase where land topography, snow conditions, and increased technology make it feasible which may contribute to increased snow compaction across the landscape over time. Regardless of the effects that Alternative 1 may have long-term, it is used as a baseline from which to compare all the other alternatives and measure LCAS standards and guidelines.

Alternative 7M also indicates an increase in over-the-snow routes of 75 miles. This alternative also indicates an increase in snowmobile closure area acres of 318,427 acres. All of the LAUs in these alternatives meet the LCAS. Meeting LCAS winter use standards may ameliorate the effect of other management activities over time.

Determination of Effect

The determination for the lynx is "may affect, not likely to adversely affect." This is because all LAUs have met the intent of the LCAS under Alternative 7M. The primary potential impact to lynx from travel management is from winter use and snow compaction. In all cases, new compacted routes by any means have been balanced by increasing areas of snowmobile closures.

Coordination Measures

Continue to monitor winter use and potential effects on lynx.

Expected future status of the Lynx

The Canada lynx was listed under ESA as threatened in 2000. It is likely to maintain this status for some time into the future. Critical habitat is currently being designated for the lynx. This is a rare mammal that is rare even in the best of habitats. In this part of its range, its primary prey, snowshoe hares, are rarely abundant. In southwest Montana and vicinity, it is likely that the status of the lynx will not improve.

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April 11, 2006

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CITATIONS

Bald Eagle

Greater Yellowstone Bald Eagle Working Group. 1996. Greater Yellowstone bald eagle management plan: 1995 update. Wyoming Game and Fish Department, Lander, Wyoming, USA.

Stalmaster, M., and J. Kaiser. 1998. Effects of recreational activity on wintering bald eagles. Wildlife Monographs 137.

Stangl, J. T. 2000. Ecology and management of bald eagles on Hebgen and Earthquake Lakes, Gallatin County, Montana. U.S. Forest Service, Gallatin National Forest, West Yellowstone, Montana, USA.

Grizzly Bear

Archibald, W. R., R. Ellis, and A. N. Hamilton. 1987. Responses of grizzly bears to logging truck traffic in the Kimsquit River valley, British Columbia. International Conference of Bear Research and Management 7:251-257.

Blix, A.S. and J.W. Lentfer. 1992. Noise and vibration levels in artificial polar bear dens as related to selected petroleum exploration and development activities. Arctic 45(1):20-24.

Cherry, M. B. 2002. Biological Assessment: The effects of snowmobile use on grizzly bears, Gallatin, Beaverhead-Deerlodge, Custer, Bridger-Teton and Shoshone National Forests, Greater Yellowstone Area. U.S. Forest Service, Gallatin National Forest, Bozeman, Montana, USA.

Chruszcz, B. A., P. Clevenger, K. E. Gunson, and M. L. Gibeau. 2003. Relationships among grizzly bears, highways, and habitat in the Banff-Bow valley, Alberta, Canada. Canadian Journal of Zoology. 81:1378-1391.

Claar, J.J., N. Anderson, D. Boyd, M. Cherry, B. Conard, R. Hompesch, S. Miller, G. Olson, H. Ihsle Pac, J. Waller, T. Wittinger, H. Youmans. 1999. Carnivores. Pages 7.1-7.63 *in* Joslin, G. and H. Youmans, coordinators. Effects of recreation on Rocky Mountain wildlife: A review of Montana. Committee on Effects of Recreation on Wildlife. Montana Chapter of the Wildlife Society. 307pp. http://www.montanatws.org/chapters/mt/pages/page4.html

Craighead, J.J. Jr., and F.C. Craighead. 1972. Grizzly bear prehibernation and denning activities as determined by radio tracking. Wildl. Mongr. No. 32. 35 pp.

Gibeau, M. L., A. P. Clevenger, S. Herrero, and J. Wierzchowski. 2001. Grizzly bear response to human development and activities in the Bow River watershed, Alberta, Canada. Biological Conservation 103: 227-236.

Goodrich, J. M. and J. Berger. 1994. Winter recreation and hibernating black bears (*Ursus americanus*). Biol. Conservation 67(1):105-110.

Gunther, K. A. 1989. Visitor impact on grizzly bear activity in Pelican Valley, Yellowstone National Park. International Conference on Bear Research and Management 8:73-78.

_____, M. A. Haroldson, K. Frey, S. L. Cain, J. Copeland, and C. C. Schwartz. 2004. Grizzly bear-human conflicts in the greater Yellowstone ecosystem, 1992-2000. Ursus 15(1):10-22.

Graves, T. A. 2002. Spatial and temporal response of grizzly bears to recreational use on trails. Thesis, University of Montana, Missoula, Montana, USA.

Graves, T., and V. Reams. 2001. Record of the Snowmobile effects on wildlife: monitoring protocols workshop. April 10-12, 2001. Denver, CO. Vol. One. 110 pp. http://www.forstry.umt.edu/research/CESU/NEWCSU/Assets/Partner%20Activities/Snowmobile%20Report.pdf

IGBC. 1987. Grizzly bear compendium. Interagency Grizzly Bear Committee, Bozeman, Montana, USA

Interagency Grizzly Bear Committee. 1998. Task Force Report. Grizzly Bear/Motorized Access Management. 6 pp.

Interagency Conservation Strategy Team (ICST). 2003. Final conservation strategy for the grizzly bear in the Yellowstone ecosystem. http://mountain-prairie.fws.gov/species/mammals/grizzly/conservationstrategygrizzlybearGYA.pdf

Jope, K. L. 1985. Implications of grizzly bear habituation to hikers. Wildlife Society Bulletin 13:32-37.

Joslin, G., and H. Youmans, coordinators. 1999. Effects of recreation on Rocky Mountain wildlife: a review for Montana. The Wildlife Society, Helena, Montana, USA. http://www.montanatws.org/chapters/mt/pages/page4.html

Judd, S.L., R. Knight and B. Blanchard. 1986. Denning of grizzly bears in the Yellowstone National Park area. Int. Conf. Bear Res. and Manage. 6:111-117.

Kasworm, W. F., and T. L. Manley. 1989. Road and trail influences on grizzly bears and black bears in northwest Montana. International Conference on Bear Research and Management 8:79-84.

Kasworm, W.F. and T.L. Manley. 1990. Road and trail influences on grizzly bears and black bears in northwest Montana. International conference on Bear Research and Management 8: 79-84.

Kolenosky, G.B. and S.M. Strathearn. 1986. Winter denning of black bears in east-central Ontario. Int. Conf. Bear Res. and Manage. 7:305-316.

Linnell, J. D., J. E. Swenson, R. Andersen, and B. Barnes. 2000. How vulnerable are denning bears to disturbance? Wildlife Society Bulletin 28(2):400-413.

Mace, R. D., and J. S. Waller. 1996. Grizzly bear distribution and human conflicts in Jewel Basin hiking area, Swan Mountains, Montana. Wildlife Society Bulletin 24(3):461-467.

_____, _____, T. L. Manley, L. J. Lyon, and H. R. Zuuring. 1996. Relationships among grizzly bears, roads, and habitat in the Swan Mountains, Montana. Journal of Applied Ecology 33(6):1395-1404.

Mace, R. D., and J.S. Waller. 1997. Final report: grizzly bear ecology in the Swan Mountains. Montana Fish, Wildlife and Parks. 1920 6th Ave. East. P.O. Box 200701, Helena, MT 59620-0701

Manville, A.M. 1983. Human impact on the black bear in Michigan's lower peninsula. Int. Conf. Bear Res. and Manage. 5:20-33.

Mattson, D.J., R.R. Knight, B.M. Blanchard. 1987. The effects of developments and primary roads on grizzly bear habitat use in Yellowstone National Park, Wyoming. International Conference on Bear Research and Management. 7:259-273.

Mattson, D. J. 1993. Background and proposed standards for managing grizzly bear habitat security in the Yellowstone ecosystem. Interagency Grizzly Bear Study Team, Bozeman, Montana, USA.

_____, and R. R. Knight. 1991. Effects of access on human-caused mortality of Yellowstone grizzly bears. Interagency Grizzly Bear Study Team, Bozeman, Montana, USA.

_____, _____, and B. M. Blanchard. 1992. The effects of developments and primary roads on grizzly bear habitat use in Yellowstone National Park, Wyoming. International Conference on Bear Research and Management 7:259-273.

McLellan, B. N., and D. M. Shackleton. 1988. Grizzly bears and resource-extraction industries: effects of roads on behavior, habitat use, and demography. Journal of Applied Ecology 25:451-460.

_____, and _____. 1989. Immediate reactions of grizzly bears to human activities. Wildlife Society Bulletin 17:269-274.

_____, and _____. 1989. Grizzly bears and resource-extraction industries: habitat displacement in response to seismic exploration, timber harvesting and road maintenance. Journal of Applied Ecology 26:371-380.

Miller, Sterling. Personal Communication to Pat Dolan, Biologist, Lolo National Forest.

Podruzny, S. R., S. Cherry, C. C. Schwartz, and L. A. Landenburger. 2002. Grizzly bear denning and potential conflict areas in the greater Yellowstone ecosystem. Ursus 13:19-28.

Reinhart, D. and D. Tyers. Exhibit #26. Effects of Winter Recreation on Grizzly Bears. Pp. 37-47. In Effects of Winter Recreation on Wildlife. National Park Service.

Ruediger, B., J. Claar, S. Gniadek, B. Hold, L. Lewis, S. Mighton, B. Naney, G. Patton, T. Rinaldi, J. Trick, A. Vandehey, F. Wahl, N. Warren, D. Wenger, and A. Williamson. 2000. Canada lynx conservation assessment and strategy. U.S. Forest Service Publication R1-00-53. (http://www.fs.fed.us/r1/wildlife/carnivore)

Reynolds, H.V., J.A. Curalto, and R. Quimby. 1976. Denning ecology of grizzly bears in northeastern Alaska. Int. Conf. Bear Res. and Manage. 3:403-409.

Reynolds, P. E., H.V. Reynolds, and E.H. Follman. 1986. Responses of grizzly bears to seismic surveys in northern Alaska. Int. Conf. Bear Res. and Manage. 6:169-175.

Schallenberger, A. 1977. Review of oil and gas exploitation impacts on grizzly bears. International Conference on Bear Research and Management 3:271-276.

Shoen, J.W., L.R. Breir, J.W. Lentfer, and L.J. Johnson. 1987. Denning ecology of brown bears on Admiralty and Chichagof Islands. Int. Conf. Bear Res. and Manage. 7:293-304.

Smith, T.R. 1983. Activity and behavior of denned black bears in the lower Mississippi River Valley. Int. Conf. Bear Res. and Manage. 6:137-143.

Schwartz, C. C., M. A. Haroldson, K. A. Gunther, and D. Moody. 2002. Current distribution of grizzly bears in the greater Yellowstone ecosystem, 1990-2000. Ursus 13:203-212.

Swenson, J. E., F. Sandegren, S. Brunberg, and P. Wabakken. 1997. Winter den abandonment by brown bears *Ursus arctos*: causes and consequences. Wildlife Biology 3(1):35-38.

Tyers, D. 2006. The Effects of Human Activities on Bears and Associated Ecological Issues. A Literature Review. 68 pp.

USDA. 1987. Gallatin National Forest Plan. U.S. Forest Service, Gallatin National Forest, Bozeman, Montana, USA.

USDA Forest Service. 2005. Programmatic Biological Assessment for Activities that are not likely to Adversely Affect Listed Terrestrial Species on the Beaverhead-Deerlodge, Bitterroot, Custer, Flathead, Gallatin, Helena, Idaho Panhandle, Kootenai, Lewis and Clark And Lolo National Forests. February 1, 2005.

_____. 1995. Gallatin National Forest Plan Amendment #19. U.S. Forest Service, Gallatin National Forest, Bozeman, Montana, USA.

USDA Forest Service. 2004. Letter from Gallatin National Forest to Mark Wilson, USFWS, dated 10/8/2004 on compliance to the 5/30/2002 BO on effects of snowmobiles on grizzly bears on 5 national forests in the GYA. 2 pp.

USDI. 1995. Biological opinion on access on the Gallatin National Forest. U.S. Fish and Wildlife Service, Helena, Montana, USA.

_____. 2002. Biological opinion on grizzly bears and snowmobiling in the greater Yellowstone area. U.S. Fish and Wildlife Service, Helena, Montana, USA.

Wielgus, R. B., P. R. Vernier, and T. Schivatcheva. 2002. Grizzly bear use of open, closed, and restricted forestry roads. Canadian Journal of Research 32:1597-1606.

Yost, A. C., and R. G. Wright. 2000. Moose, caribou, and grizzly bear distribution in relation to road traffic in Denali National Park, Alaska. Arctic 54(1):41-48.

Canada Lynx

Apps, C. D. 1999. Space-use, diet, demographics, and topographic associations of lynx in the southern Canadian Rocky Mountains: a study. Pages 351-372 *in* L. F. Ruggiero, K. B. Aubry, S. W. Buskirk, G. M. Koehler, C. J. Krebs, K. S. McKelvery, and J. R. Squires. 2000. Ecology and conservation of lynx in the United States. U.S. Forest Service General Technical Report RMRS-GTR-30WWW. (http://www.fs.fed.us/rm/pubs/rmrs_gtr30.html)

Aubry, K. B., G. M. Koehler, and J. R. Squires. 1999. Ecology of Canada lynx in southern boreal forests. Pages 373-396 *in* T. W. Butts, editor. 1992. Lynx (*Felis lynx*) biology and management: a literature review and annotated bibliography. U.S. Forest Service, Missoula, Montana, USA.

Bailey, T. N., E. E. Bangs, M. F. Portner, J. C. Malloy, and R. J. McAvinchey. 1986. An apparent over harvested lynx population on the Kenai Peninsula, Alaska. Journal of Wildlife Management 50:279-290.

Brainerd, S. M. 1985. Reproductive ecology of bobcats and lynx in western Montana. Thesis, University of Montana, Missoula, Montana, USA.

Brittell, J. D., R. J. Poelker, S. J. Sweeney, and G. M. Koehler. 1989. Native cats of Washington. *In* T. W. Butts, editor. 1992. Lynx (*Felis lynx*) biology and management: a literature review and annotated bibliography. U.S. Forest Service, Missoula, Montana, USA.

Bunnell, Kevin D., Flinders, Jerran T., Wolfe, Michael L., and Bissonette, John A. 2004. Quantifying the potential impacts of coyotes and snowmobiles on lynx conservation in Utah and the intermountain west, Chapter 2, pages 20-49. *In*: Bunnell, Kevin D., Shirley, Justin J., Flinders, Jerran. T., Wolfe, Michael L., Bissonette, John A. 2004. Forest carnivores occurrence, distribution, and limiting factors: Canada lynx and wolverine surveys in Utah. Provo and Logan, UT: Brigham Young University and Utah State University; Final Report

to Utah Division of Wildlife Resources, U.S. Forest Service, U.S. Fish and Wildlife Service. 76 pp.

Claar, J. J., N. Anderson, D. Boyd, M. B. Cherry, B. Conard, R. Hompesch, S. Miller, G. Olson, H. Ihsle Pac, J. Waller, T. Wittinger, and H. Youmans. 1999. Carnivores. Pages 7.1-7.61 *in* G. Joslin and H. Youmans, coordinators. Effects of recreation on Rocky Mountain wildlife: a review for Montana. The Wildlife Society, Helena, Montana, USA. (www.montanatws.org)

Claar, Jim. 2005. Lynx Biology Team Final Report. Missoula, MT: USDA Forest Service, Region 1, Lynx Biology Review Team; final report. Xx pp^.

Claar, Jim. 2006. Section 7 consultation obligations for the Canada lynx given the recent release of several lynx related documents. Draft advisory white paper, version March 23. 5 pp.

Craighead, F. L. 2002. Wildlife-related road impacts in the Yellowstone to Yukon region. Unpublished report for the Yukon to Yellowstone Science Program. Travel Management Plan project file, U.S. Forest Service, Gallatin National Forest, Bozeman, Montana, USA.

Dixon, B. 2004. May 26 memorandum: travel plan pre-consultation meeting with U.S. Fish and Wildlife Service. U.S. Forest Service, Gallatin National Forest, Bozeman, Montana, USA.

Hash, H. 1990. Montana lynx population status and considerations. Montana Department of Fish, Wildlife and Parks, Helena, Montana, USA.

Koehler, G. M. 1988. Demographic characteristics and habitat requirements of lynx (*Lynx canadensis*) in north central Washington. *In* T. W. Butts, editor. 1992. Lynx (*Felis lynx*) biology and management: a literature review and annotated bibliography. U.S. Forest Service, Missoula, Montana, USA.

_____. 1990. Population and habitat characteristics of lynx and snowshoe hares in north-central Washington. Canadian Journal of Zoology 68:845-851.

_____, and J. D. Brittell. 1990. Managing spruce-fir habitat for lynx and snowshoe hares. Journal of Forestry 88:10-14.

_____, and K. B. Aubry. 1994. Lynx. Pages 74-98 *in* L. F. Ruggiero, K. B. Aubry, S. W. Buskirk, L. J. Lyon, and W. J. Zielinski. 1994. American marten, fisher, lynx, and wolverine in the western United States. U.S. Forest Service General Technical Report RM-254.

Kolbe, J. A. 2005. The effect of snowmobile trails on coyote movements within lynx home ranges. MSc. Thesis. University of Montana, Missoula, Montana, USA.

Lynx/ Wolverine Steering Committee. 2001. Lynx conservation assessment and strategy – clarifications and revised terminology. [Meeting notes dated October 23-24]. Available at: http://www.fs.fed.us/r1/planning/lynx/reports/LCAS_revisions_Oct_2001.pdf. 3 pp.

Lyon, L. J., K. B. Aubry, W. J. Zielinski, S. W. Buskirk, and L. F. Ruggiero. 1994. The scientific basis for conserving forest carnivores: considerations for management. Page 133 *in* L. F. Ruggiero, K. B. Aubry, S. W. Buskirk, L. J. Lyon, and W. J. Zielinski. 1994. American marten, fisher, lynx, and wolverine in the western United States. U.S. Forest Service General Technical Report RM-254.

Mcallister, Kathleen A. 2003. August 28 letter to Regional Forester(s). Travel management plan project file. U.S. Forest Service, Gallatin National Forest, Bozeman, Montana, USA.

_____, Kathleen A. 2003. November 13 letter to Marc Bosch and others. Travel management plan project file. U.S. Forest Service, Gallatin National Forest, Bozeman, Montana, USA.

McKelvey, K. S. 2004. July 2 electronic message and zip file. Travel Management Plan project file. U.S. Forest Service, Gallatin National Forest, Bozeman, Montana, USA.

_____, J. J. Claar, G. McDaniel, and G. Hanvey. 1999. National lynx detection protocol. U.S. Forest Service, Rocky Mountain Research Station, Missoula, Montana, USA.

_____, K. B. Aubry, and Y. K. Ortega. 2000. History and distribution of lynx in the contiguous United States. Pages 207-264 *in* L. F. Ruggiero, K. B. Aubry, S. W. Buskirk, G. M. Koehler, C. J. Krebs, K. S. McKelvey, and J. R. Squires. 2000. Ecology and conservation of lynx in the United States. U.S. Forest Service General Technical Report RMRS-GTR-30WWW. (http://www.fs.fed.us/rm/pubs/rmrs_gtr30.html)

Montana Natural Heritage Program. 2004. Lynx observation database. Retrieved June 16, 2004 from http://nhp.nris.state.mt.us/requests/index.html

Mowat, G., K. G. Poole, and M. O'Donoghue. 1999. Ecology of Lynx in Northern Canada and Alaska, Pages 265-306 *in* L. F. Ruggiero, K. B. Aubry, S. W. Buskirk, G. M. Koehler, C. J. Krebs, K. S. McKelvery, and J. R. Squires. 2000. Ecology and conservation of lynx in the United States. U.S. Forest Service General Technical Report RMRS-GTR-30WWW. (http://www.fs.fed.us/rm/pubs/rmrs_gtr30.html)

Murphy, K., T. Potter, J. Halfpenny, K. Gunther, T. Jones, and P. Tilden Lundberg. 2004. Final report: the presence and distribution of Canada lynx (*Lynx canadensis*) in Yellowstone National Park, Wyoming. National Park Service, Yellowstone National Park, Wyoming, USA.

Olliff, T., K. Legg, and B. Kaeding, editors. 1999. Effects of winter recreation on wildlife of the Greater Yellowstone Area: a literature review and assessment. Report to the Greater Yellowstone Coordinating Committee. Yellowstone National Park, Wyoming. 315 pp.

Ruediger, B., J. Claar, S. Gniadek, B. Hold, L. Lewis, S. Mighton, B. Naney, G. Patton, T. Rinaldi, J. Trick, A. Vandehey, F. Wahl, N. Warren, D. Wenger, and A. Williamson. 2000. Canada

lynx conservation assessment and strategy. U.S. Forest Service Publication R1-00-53. (http://www.fs.fed.us/r1/wildlife/carnivore)

Ruggiero, L. F., K. B. Aubry, S. W. Buskirk, G. M. Koehler, C. J. Krebs, K. S. McKelvey, and J. R. Squires. 1999. The scientific basis for lynx conservation: qualified insights. Pages 443-454 *in* L. F. Ruggiero, K. B. Aubry, S. W. Buskirk, G. M. Koehler, C. J. Krebs, K. S. McKelvey, and J. R. Squires. 2000. Ecology and conservation of lynx in the United States. U.S. Forest Service General Technical Report RMRS-GTR-30WWW. http://www.fs.fed.us/rm/pubs/rmrs_gtr30.html)

Squires, J. R., and T. Laurion. 1999. Lynx home range and movements in Montana and Wyoming: preliminary results. Pages 337-350 *in* L. F. Ruggiero, K. B. Aubry, S. W. Buskirk, G. M. Koehler, C. J. Krebs, K. S. McKelvey, and J. R. Squires. 2000. Ecology and conservation of lynx in the United States. U.S. Forest Service General Technical Report RMRS-GTR-30WWW. (http://www.fs.fed.us/rm/pubs/rmrs_gtr30.html)

Todd, A. 1985. The Canada lynx: ecology and management. Canadian Trapper 3:15-20. *In* T. W. Butts, editor. Lynx (*Felis lynx*) biology and management: a literature review and annotated bibliography. 1992. U.S. Forest Service, Missoula, Montana, USA.

USDA. 1987. Gallatin National Forest Plan. U.S. Forest Service, Gallatin National Forest, Bozeman, Montana, USA.

USDI. 2003. Endangered and threatened wildlife and plants; notice of remanded determination of status for the contiguous United States distinct population segment of the Canada lynx; clarification of findings; final rule. U.S. Fish and Wildlife Service. Federal Register 50 Code of Federal Regulations, Part 17, Volume 68(128):6840076-6840101.

_____. 2005a. Endangered and threatened wildlife and plants; proposed designation of critical habitat for the contiguous United States distinct population segment of the Canada lynx; proposed rule. U.S. Fish and Wildlife Service. Federal Register 50 Code of Federal Regulations, Part 17, Volume 70(216):68294-68328.

_____. 2005b. Recovery outline - contiguous United States distinct population segment of the Canada lynx. Helena, MT: U.S. Department of Interior, Fish and Wildlife Service. 21 pp.

U.S. Department of Agriculture, Forest Service and U.S. Department of Interior, Fish and Wildlife Service. 2005. Canada lynx conservation agreement. USFS Agreement #00-MU-11015600-013. Available at: http://www.fs.fed.us/r1/planning/lynx/reports/LynxCA_final_060105.pdf. 9 pp.

Page 8: Table I-2. Total Miles figure for Pleasure Driving (Plowed Road) should read 168 rather than 167.

Page 32: Tables 3.10.3 and 3.10.4 of the BA were missing numbers for grizzly bear subunit Crandall/ Sunlight #2. Those corrected tables follow:

Table 3.10. 25 Percent of six habitat value categories in each of the grizzly bear management subunits on the Gallatin National Forest. Six categories were determined from raw CEM habitat value outputs that provide relative comparisons across seasons. They are: VL = Very Low, L = Low, LM = Low Moderate, HM = High Moderate, H= High, VH = Very High. Excerpted from p.143 of the Conservation Strategy (ICST 2003).

	Habitat Value Category Percent of Subunit							Habitat Value Category Percent of Secure Habitat						
Subunit	VL	L	LM	HM	H	VH	Subunit Area (sq mi)	VL	L	LM	HM	H	VH	Total Secure Habitat (sq mi)
Boulder Slough #1	12	1	40	45	32	0	282	13	1	42	43	2	0	272
Boulder Slough #2	9	6	33	52	1	0	232	9	6	34	50	1	0	227
Lamar #1	4	2	26	68	1	0	300	4	1	25	70	0	0	268
Crandall Sunlight #1	10	34	43	11	2	0	130	11	35	42	10	2	0	105
Crandall Sunlight #2	5	30	34	30	1	0	316	4	32	34	29	1	0	260
Hellroaring/Bear #1	17	20	12	51	0	0	185	17	15	11	57	0	0	142
Hellroaring/Bear #2	21	5	26	47	2	0	229	21	5	26	46	2	0	228
Gallatin #3	18	17	13	51	1	0	218	21	12	12	55	1	0	120
Hilgard #1	19	12	18	51	1	0	201	20	10	19	51	0	0	140
Hilgard #2	13	8	17	61	1	0	141	15	8	13	64	1	0	100
Madison #1	4	12	52	21	10	2	227	5	12	58	17	8	1	163
Madison #2	2	6	69	19	3	2	149	0	4	79	14	2	1	99
Henrys Lake #2	7	19	26	46	2	1	140	9	17	24	50	0	1	64
Plateau #1	2	29	58	11	0	0	286	1	28	58	13	0	0	197

Table 3.10. 26 Habitat effectiveness by season for subunits on the Gallatin National Forest from the Grizzly Bear Cumulative Effects Model. Subunits "in need of improvement" of secure habitat are highlighted. Excerpted from p. 141 of the Conservation Strategy (ICST 2003).

Subunit	Spring 3/1 - 5/15	Estrus 5/16 - 7/15	Early Hyperphagia 7/16 - 8/31	Late Hyperphagia 9/1 - 11/30
Boulder Slough #1	105*	105	119	853
Boulder Slough #2	123	112	111	521
Lamar #1	127	118	136	571
Crandall Sunlight #1	53	94	78	800
Crandall Sunlight #2	52	82	124	329
Hellroaring/Bear #1	85	74	95	628
Hellroaring/Bear #2	117	99	98	628
Gallatin #3	**78**	**69**	**89**	**599**
Hilgard #1	99	68	91	614
Hilgard #2	81	97	132	902

Madison #1	53	115	227	329
Madison #2	**41**	**60**	**147**	**63**
Henrys Lake #2	**41**	**41**	**33**	**614**
Plateau #1	26	49	36	109

* Numbers for habitat effectiveness by season with higher numbers equating with greater value are calculated by computer program (ICST 2003 p.140). Habitat effectiveness is a relative measure of that part potentially derived from an area that is available to bears given their responses to humans..

Page 55: Seasonal restriction dates for motorized vehicles on trails within the Hilgard #1 and Hilgard #2 BMS's as reported in the BA were incorrect. Actual seasonal restriction dates were 12/2 through 7/15 for motorize use on the Oil Well Road ATV/motorcycle trail and 11/15-7/15 for all other motorized trails, which would reduce disturbance in spring/early summer grizzly bear habitat.

Sentences 3 and 4 in paragraph 2 of the Hilgard #2 BMS discussion referenced Alternative 7 in the BA. Alternative 7 was replaced by Alternative 7M, so these statements are not accurate. To clarify, Alternative 7M is substantially different than Alternative 2 and core habitat would be increased by 2.5%. This represents an improvement over the current condition.

Page 56: The seasonal restriction dates for motorized trails in the Madison #1 BMS were incorrectly stated in the BA. Motorized use on motorcycle trails would actually be restricted from 11/15-7/15 and ATV/motorcycle trails would be restricted from 12/2-7/15 in this area, which would reduce disturbance in spring/early summer grizzly bear habitat.

Page 57: Motorized use on the Two Top Trail was reported to be restricted until 7/15 in the BA. The actual period of restriction on motorized use would be 12/2-6/30, which would still reduce disturbance within spring/early summer grizzly bear habitat. Additionally, this trail is located within the adjacent Henry's Lake #2 BMS rather than the Plateau #1 BMS.

Page 58: The seasonal restriction dates for the East Cream Creek Road #1730 and Beaver Pond Road #1723 were not reported correctly in the BA. The actual period of restriction on motorized use for these roads would be Dec 2-May1 with no resulting benefit to grizzly bears. Additionally, these roads are located within the Henry's Lake #2 BMS rather than the Plateau #1 BMS.

In the Henry's Lake #2 BMS, a restriction on motorized use until 6/16 was reported in the BA for the West Fork Denny Creek Road #1735. This road would have no seasonal restrictions on motorized use.

Page 3-67: Table 3.10.23 – in the Total row, Alt. 1 should be 50 and Alt. 5 should be 60 rather than 5 and 6, respectively

Page 3-72: The private lands subdivision along the South Fork of the Madison River is within the Henry's Lake #2 BMS rather than the Madison #2 BMS (see paragraph 7).

Page 105: The description of designated snowmobile routes for Alternative 7M in the Upper Gallatin LAU is incorrect. Under Alternative 7M, there would be no designated route from the Taylor Fork Road #134 through the snowmobile closure to Wapiti Cabin. The only access to

Wapiti Cabin would be from the Sage Creek Trailhead via Trails #71 and #68, which would also be the snowmobile closure boundary in this area.

Page 106: The description of the Upper Madison LAU for Alternative 7M indicated that there would be 2 new designated snowmobile routes through a snowmobile closure area. This is not accurate, as the 2 routes through the snowmobile closure area have been designated since 1994 and are part of the baseline for this LAU.

Travel Plan Goals, Directions, Standards and Guideline relevant to T&E species and grizzly bear appearing on pp. 13-15 of the BA were slightly modified for Alternative 7M. Rather than as stated from the bottom part of this page 13 starting with "Standard A-8" and continuing to the middle of page 15 – this should be replaced with the following which compares the alternatives. The changes to 7M are generally preferable for T&E and other wildlife species and were proposed by the wildlife and fisheries biologists.

Alternatives 2 through 7M propose a number of goals and objectives to provide for recreation opportunity, access and to improve other resource conditions that may have been adversely affected by the Forest's transportation system. Goals and objectives, by themselves, have no environmental effect because they do not constitute final agency decisions. Environmental effect under NEPA is more appropriately addressed at such time that specific actions are proposed to achieve these goals and objectives. The proposed Travel Management Plan does include the final agency decisions for management of public travel and this reflects implementation of the goals and objectives proposed for recreation opportunity (for example Forest-wide Goal A, Objective A-1, and Travel Planning Area Goals 1 and 2 and Objectives 1-1 and 2-1). The predicted direct, indirect and cumulative effects of public travel on Biodiversity, and hence the implementation of these goals and objectives are addressed earlier in this section.

Alternatives 2 through 7M also propose standards and guidelines to provide for protection of other resources during Travel Plan implementation. Standards and guidelines include protection measures within which future proposals for road and trail construction, reconstruction, maintenance and decommissioning must take place. These are considered final agency decisions because they set limitations within which future actions must take place.

The proposed goals, objectives, standards and guidelines that are relevant to the protection and improvement of Biodiversity are discussed below.

Where Alternative 7M differs from Alternatives 2-6, it is noted below in parentheses. The benefits to biodiversity accrue through the implementation of any alternative which designates routes, places the Forest under the OHV EIS and generally reduces motorized routes and protects wildlife habitat. There is a goal for wildlife corridors (Goal E in Alternatives 2-6 and Goal F in Alternative 7M) which are specifically addressed in this issue. Other items are more general but benefit biodiversity by protecting or enhancing habitat for wildlife and/or fish, protecting rare habitats or rare species, promoting connectivity, or reducing human impacts. Additional comments on how this direction affects biological diversity appear below in italics.

Proposed Forest-wide Direction, Alternatives 2-6 and 7M

Standard A-6. Off-route travel. Wheeled motorized vehicle travel shall be prohibited off of designated routes with the following exceptions. (This standard and the following exceptions under Alternatives 2-6 become Standard A-8 in Alternative 7M. There are slight modifications of wording in the exceptions from Alts. 2-6 to Alt. 7M.) *This standard is beneficial to many species of plants and animals, including grizzly bears, by limiting almost all use to designated routes with minor exceptions, rather than allowing off-route use.*

GOAL C. Resources (General). Manage a system of roads and trails and associated public use that is consistent with Forest Plan goals for water quality; wildlife habitat; fish habitat; threatened and endangered species recovery; and historical resources (Note: Until Forest Plan revision refer to Forest Plan (9/87), pages II-1, II-2, and Amendment 19). (This Goal under Alternatives 2-6 becomes Goal D in Alternative 7M, and the following objectives remain the same.) *This goal is beneficial to many species and their habitats on the Forest by allowing uses consistent with water quality, wildlife habitat, fish habitat, etc.*

> **OBJ. C-1. Road Rehabilitation.** Close and rehabilitate existing roads that are in excess to administrative, recreation and access needs. (This objective becomes **Objective D-1** under Alternative 7M.) *This objective reduces the amount of roads and their effects on the landscape to grizzly bears.*
>
> **OBJ. C-2. Trail Rehabilitation.** Close and rehabilitate existing non-system trail not otherwise designated for public travel. (This objective becomes **Objective D-2** under Alternative 7M.) *This objective reduces impacts of humans to grizzly bears.*

GOAL D. Fisheries. Manage a road and trail system that fully supports the beneficial use of growth and propagation of salmonid fishes and associated aquatic life. This is followed by a number of objectives. (In Alternative 7M, Goal D becomes **Goal E. Water Quality, Riparian, Fisheries and Aquatic Life** with numerous objectives, standards, and one guideline.) *The protection of water quality, riparian habitats, fisheries and aquatic life is important for many speciesk including the grizzly bear. The language in Alternative 7M is an improvement over the language in Alts. 2-6.*

GOAL E. Wildlife Corridors. Provide for wildlife movement and genetic interaction (particularly grizzly bear and lynx) between mountain ranges at Bozeman Pass (linking the Gallatin Range to the Bridger/Bangtails); in the North Bridgers (linking the Bridger Range to the Big Belt Mountains; across highway 191 from Big Sky to it's junction with highway 287 (linking the Gallatin and Madison Mountain Ranges); the Lionhead area (linking the Henry's Lake Mountains to the Gravelly Mountains and areas west); Yankee Jim Canyon (linking the Absaroka Mountains to the Gallatin Range); and at Cooke Pass (linking the Absaroka/Beartooth Range to areas south). *This goal and TPA specific objectives help protect and allow for movement of wildlife between mountain ranges.* (Under Alternative 7M, Goal E becomes **GOAL F. Wildlife Corridors**, and it is worded differently. Provide for wildlife movement and genetic interaction (particularly for wide-ranging species) between and within mountain ranges throughout the Gallatin National Forest and connecting wildlands. **OBJ. F-1.** Provide habitat connectivity consistent with wildlife movement patterns between mountain ranges such as that at Bozeman Pass (Linking the Gallatin Range to the

Bridger/Bangtails); the North Bridgers (linking the Bridger Range to the Big Belt Mountains; the Lionhead Area (linking the Henry's Lake Mountains to the Gravelly Mountains); the Shields (Crazy Mountains to the Castle and Little Belt Mountains) and any additional linkage or wildlife movement corridors recognized by the Forest Service.) *The language change between Alts. 2-6 and 7M is an effort to move all of the direction into Forest-wide direction, and allows recognition of the potential addition of new corridors in the future. It also names the corridors that seem to be important connections among mountain ranges and deletes a few of the corridors that are currently less well documented. Corridors are recognized as essential parts of maintaining biodiversity by allowing wildlife movement and allowing wildlife populations to be as connected as they have been in the past. Corridors are important for wide ranging species such as the grizzly bear.*

GOAL F. Threatened, Endangered and Sensitive Wildlife Species. Manage human use of the Forest road and trail system that allows for the recovery of threatened and endangered species and maintains sensitive species and their habitats. (This becomes **Goal G. Threatened, Endangered and Species of Special Management Designation**. This wording change from Sensitive Species to Species of Special Management Designation allows for the potential change of designations of species that the Forest manages under the New Planning Rule such as Special of Concern.) *This goal helps protect and recover T&E species, such as the grizzly bear, and other rare species and their habitats.*

OBJ. F-1. Grizzly Bear Recovery. Within the grizzly bear recovery zone reduce total summer motorized access route density and increase core (secure) habitat, consistent with the Grizzly Bear Conservation Strategy, within subunits Gallatin #3, Henry's Lake #2 and Madison #2. Provide effective closures on access routes not designated for motorized use. (In Alts. 2-6.) (Under Alternative 7M **Objective G-1** is: Provide effective closures on access routes not designated for motorized use. Grizzly Bear subunits Gallatin #3, Henry's Lake #2, and Madison #2 and non-designated routes that are attractive to motorized use within secure grizzly bear habitat should receive high priority.) *This helps assure that priority is given to closing routes in important grizzly bear habitat.*

OBJ. F-2. Grizzly Bear Recovery. Provide for no human-grizzly bear interaction that results in personal injury or bear mortality. Provide all visitors to the trail system of the Gallatin National Forest with information on proper food storage and safe recreation use. (In Alts. 2-6.)

STANDARD F-1. Grizzly Bear Recovery. Within the grizzly bear recovery zone (as described in Gallatin Forest Plan, 9/87), any new motorized route constructed and used for administrative or other purposes will be offset by closure of another open motorized route of equal or greater length within the same bear management subunit. (This standard is applicable to alternatives 2 through 6 and is based on Amendment 19 of the 1987 Gallatin National Forest Land and Resource Management Plan (1995) that established certain requirements for the protection of the threatened grizzly bear.)

STANDARD F-2. Lynx. In accordance with the Lynx Conservation Strategy there shall be no net increase in any groomed or marked snowmobile or ski routes or designated play areas on the Gallatin National Forest. (This standard applies to alternatives 2 through 6. The standard would mean that there could not be a net increase in groomed or marked routes or play areas once the travel planning decision has been made. This standard does not exist in Alternative 7M).

Under Alternative 7M, Guidelines G-2 Species of Special Management Designation, and **Guideline G-3, Threatened and Endangered Species** are brought into the EIS. Under

G-2, new proposed routes are located to avoid important habitats of Species of special management designation, and mitigation measures are suggested. **Guideline G-3** for T&E species allows for temporary localized restrictions to prevent conflicts with T&E species.

In addition to the proposed programmatic direction, travel management under Alternative 7M would follow current direction applicable to the management of grizzly bear and lynx. At the time of this EIS publication, the applicable direction is based on Memorandums of Understanding (MOU's) and Conservation Agreements (CA) with the United States Fish and Wildlife Service (USFWS). See MOU, Conservation Strategy (ICST 2003:12-13), the USFWS Biological Opinion on Access (1995), and Canada Lynx Conservation Agreement (2005). *Alternative 7M, by following current direction for grizzly bear and lynx and by that wording allowing the Grizzly Bear Conservation Strategy for Grizzly Bears in the GYA and the Northern Rockies Lynx Amendment to become our current direction as these decisions are made, benefits these T&E species by using the best science and current information in their management.*

GOAL G. Wildlife. Provide for healthy vegetative conditions in key habitats such as willow, riparian, wetlands, whitebark pine, and potential old growth. (This becomes **Goal H. Wildlife** in Alternative 7M, and several other key habitats are enumerated.) *Maintaining key habitats, which host more species than other habitats. Some of these rare habitats such as riparian habitat and old growth are very important for grizzly bear..*

OBJ. G-1. Strive for no unclassified, undesignated roads and trails within key habitats that have been damaged or is devoid of native vegetation due to motorcycle, ATV, horse or foot use. (This Objective is dropped from Alternative 7M, and **Guidelines H-1 and H-2** are added. **H-1**. Relocate, reconstruct or take other appropriate action on system roads and trails that are found to have adverse impacts on key habitats. **H-2**, Roads and trails should be located to avoid key habitats or mitigate the impacts.) *Maintaining key habitats that are important for many wildlife species.*

GOAL H. Wildlife. Provide high quality security habitat in areas important to wildlife reproduction (e.g. calving, fawning, denning and nesting habitat). (This becomes **Goal I** in Alternative 7M.) *Protection of reproductive habitats is important for protecting and maintainingn one of the important food sources for grizzly bears.*

OBJ. H-1. Minimize stress factors from human recreation use to species of concern during calving, fawning, denning and nesting seasons in habitats used for reproduction. See specific travel management area direction. (This becomes **Guideline I-1** in Alternative 7M.)

GOAL I. Wildlife. Provide high quality security habitat on important ungulate winter range. (In Alternative 7M this was consolidated into Goal H.)

OBJ. I-1. Ungulates. Eliminate stress factors from human winter recreation use to ungulates in important winter range areas. (This Objective is part of Objective I-1 in Alternative 7M.) *Although ungulates tend to be common species, providing security on big game winter range also benefits other species that occur there. Grizzly bears often move onto ungulate winter range soon after den emergence, and protection of security of these areas benefits grizzlies.*

Guideline I-2. This is new under Alternative 7M and states that in management of winter travel should consider MFWP goals for optimal survival on big game winter ranges.

Alternatives 3 and 7M both have language regarding the consideration of backcountry airstrips. Basically, proposals for airstrips (airplane and helicopter) will be considered and must go through

NEPA analysis and would be under special use permits. Under Alternative 3, a number of airstrips are proposed, including several in the Recovery Zone. Under Alternative 7M, backcountry airstrips for public recreational use will not be considered in designated Wilderness, the Hyalite-Porcupine/Buffalo Horn Wilderness Study Area, the Cabin Creek Recreation Wildlife Management Area, the Lionhead and Republic Mountain Recommended Wilderness Areas, or within the Grizzly Bear Recovery Zone. For biodiversity, it is preferable not to allow airstrips at all, but if allowed, Alternative 7M, which restricts some areas for this activity, is preferable over Alternative 3.

In Alternatives 2-6, there were additional categories of Administrative Uses and Road and Trail Construction, Reconstruction and Maintenance for Forest Plan direction. These do not exist under Alternative7M, but are meshed with other Goals, Objectives, Standards and Guidelines.

Territory Name	Zone I	Zone II	Zone III
Horse Butte	Yes	No	Yes
Ridge	No	No	No
Narrows	No	No	No
Canyon	Yes	Yes	Yes
Halford Camp	Yes	No	No
Moonlight	Yes	Yes	Yes

Addendum

Supplemental Information for Gallatin National Forest Travel Plan Biological Assessment, Bald Eagle Analysis – July 24, 2006

Compliance with GYBEMP guidelines for winter travel

Compliance with GYBEMP guidelines for summer travel.

Territory Name	Zone I	Zone II	Zone III
Horse Butte	No	No	No
Ridge	Yes	No	No
Narrows	Yes	Yes	No
Canyon	Yes	No	No
Halford Camp	Yes	Yes	No
Moonlight	No	No	No

Baseline information on Bald Eagles for BA

Horse Butte

This territory on the Horse Butte Peninsula of Hebgen Lake was detected in 1977 and has been monitored annually since then. It has been the least productive territory in the analysis area, with young fledged only three times since 1990 even though the territory was active each year. The territory is characterized by a high level of human activity during both summer and winter. Forest Road #610, a major access route to Hebgen Lake, passes within Zones I, II and III of the nest. The Horse Butte Lookout Road is within Zone II, while several non-Forest Service roads through Zones I, II and III provide access to housing developments on private land. In winter, the groomed Horse Butte snowmobile trail passes through Zones I, II and III of the nest. Additionally, heavy off-trail snowmobile use occurs within Zones II and III of the nest. A Special Order closing an approximately 75-acre area encompassing much of Zone I of the territory from December 1 to August 15 to all human activity (including snowmobile use) has been implemented since 1994.

Ridge

This territory is also located on the Horse Butte Peninsula of Hebgen Lake, and has been monitored annually since it was first detected in 1994. This pair has successfully fledged young during 7 of the 12 years it has been monitored, and is among the least productive territories in the analysis area. A two-track administrative road that currently receives little summer use passes very close to the nest within Zone I, while Forest Road #610 is a major access route for Hebgen Lake located within Zones II and III. A groomed snowmobile trail is within Zones II and III of the nest, and heavy off-trail snowmobile use occurs within Zones I, II and III of the nest. The snowmobile trail is generally groomed from December 1 to March 31, although in some years lack of snow cover terminates snowmobile use before then, while in heavy snow years, snowmobile use may continue into early April. Evidence indicates that these birds may be sensitive to off-trail snowmobile use, although insufficient data exist to definitively identify snowmobile use as a contributing factor to its lower productivity.

Narrows

This territory, located on the Horse Butte Peninsula of Hebgen Lake, was detected in 1995 and has been monitored annually since then. It has successfully fledged young nine of the eleven years it has been monitored. An open two-track Forest Service road passes within Zones I and II of the nest, as does a groomed snowmobile trail. Zones I, II and III receive heavy off-trail snowmobile use as well. The snowmobile season is the same as was described for the Ridge nest. The Narrows territory has been highly productive despite snowmobile use on and off the groomed trail in close proximity to the nest, indicating that these birds are tolerant of human activity.

Moonlight

This territory is located near the mouth of Moonlight Creek on Hebgen Lake. Young were fledged in 15 of the 16 years it has been monitored since it was first detected in 1990. Forest Road #167, which is the major access road for the west side of Hebgen Lake, passes within Zones I, II and III of this nest. The road is open for public passenger car use in the summer and snowmobile use in the

winter. The area is open to off-designated route snowmobile use but there are no groomed trails and heavy forest cover precludes most snowmobile use off the roadway.

Canyon

This territory located on Earthquake Lake was first detected in 1990. Young were fledged from this territory during 9 of 14 years. Zone I of this territory is within Earthquake Lake, and the steep, inaccessible terrain south of the Lake and has no summer travel routes. The only summer travel routes within Zone II are associated with the Beaver Creek Campground. Zones I, II and III are open for snowmobile use, but there are no groomed trails and the area south of the nest cannot be accessed by snowmobiles. A portion of Zones II and III north of Earthquake Lake are open to snowmobiles, but receive very light use.

Halford Camp

This territory located on Earthquake Lake was detected in 2003, and has successfully fledged chicks in one of three years since then. There are no summer or winter travel routes within Zone I of the nest. The Campfire Lodge Road provides passenger car access to a popular parking and picnic area within Zone III, and an administrative road to Ghost Village that also receives heavy summer non-motorized use is located within Zones II and III. Much of Zone II is open to snowmobile use, but there are no groomed or designated trails and it receives only very light use. There is a designated ski/snowshoe trail within Zone III.

Grayling Arm

Travel planning is not issue for this nest located on the Grayling Arm of Hebgen Lake. There is only one low-standard administrative road that receives light use for power line right-of-way maintenance within Zones I, II and III of the nest. All of Zones I, II and III are open to snowmobile use, but there are no groomed trails and off-trail use is largely precluded by forest cover.

Quake Lake

Travel planning is not issue for this nest located on Earthquake Lake. U.S. Highway 287 is within Zone II of the nest, but there are no other summer or winter travel routes within Zones I, II and III. The area receives little or no winter use, either motorized or non-motorized, due to the steep and inaccessible terrain.

The following information was provided by Andy Pils of the Gallatin National Forest, Hebgen Lake Ranger District to Katrina Dixon of the USFWS on 8/8/06:
The Horse Butte bald eagle nest has been successful 11 of past 30 yrs (1977, 1978, 1980, 1984, 1985, 1986, 1987, 1989, 1992, 1999, 2004) for a nest success of 37%.